

THE NEW
STUDENTS
REFERENCE
WORK







THIS BOOK
BELONGS TO



THE NEW
STUDENT'S REFERENCE WORK

FOR

TEACHERS, STUDENTS AND FAMILIES

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THE STUDENT'S CYCLOPAEDIA

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ARITHMETIC.

THE FOREWORD.

The aim of this treatise on Arithmetic is

1. To develop the parts of the subject most likely to be of practical value to the pupil in after-life.

2. To eliminate subjects which perplex the pupil without affording any valuable mental discipline.

This work will be found especially valuable in the home, as it furnishes instruction and carefully graded exercises.

1. For pupils who fall behind their class on account of absence.

2. For pupils who are slow to comprehend the teacher's explanation.

3. For pupils who fail of promotion and who wish to study during the summer vacation.

The steps to be acquired by the pupil in the study of Arithmetic are

1. A knowledge of number.

2. The expression of number.

3. Power and skill in operations.

4. Logical and accurate thinking.

The teacher should realize that

1. Arithmetic deals with numbers not figures.

2. Primary ideas of numbers and of operations should be gained from objects.

3. Pupils must be thoroughly drilled on the fundamental operations of Arithmetic.

4. Pupils must be impressed with the importance of absolute correctness.

The pupil must be taught to interpret the language of the problem,

1. To know exactly what is given.

2. To know the relation of what is given, and from this knowledge to select the proper arithmetical process.

3. To perform the arithmetical process.

4. To forecast, when possible, the approximate answer.

Pupils should be urged to devise problems to be solved.

If a child does the work mapped out, drilling on the fundamentals, reading the problems carefully and thoughtfully, picturing the objects as they are described, he will, as a result, be ready to solve problems by abstract thinking.

ARITHMETIC.

Arithmetic is the study of numbers and their uses. Numbers are expressed by figures.

These figures are:

1 2 3 4 5 6 7 8 9 0
One, Two, Three, Four, Five, Six, Seven, Eight, Nine, Zero.

The figure zero is never read. It merely indicates that that order is omitted.

Numbers greater than 9 are expressed by writing two or more figures side by side.

NUMERATION TABLE.

4,	Trillions.	2	Hundred-billions.	2	Ten-billions.	2	Billions.	2	Hundred-millions.	2	Ten-millions.	2	Millions.	0	Hundred-thousands.	4	Ten-thousands.	2	Thousands.	2	Hundreds.	8	Tens.	9	Units.	.	Decimal point.	0	Tenths.	0	Hundredths.	2	Thousandths.	4	Ten-thousandths.	2	Hundred-thousandths.	2	Millionths.
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Our system of numbers is based on the decimal system.

Every time we move a figure one place to the left of the decimal point, we multiply it by 10.

Every time we move a figure one place to the right of the decimal point, we divide it by 10.

Every three figures in any number, counting from the decimal point to the left, form a period.

Periods of figures are separated from each other by commas.

The names of the periods in order from the decimal point to the left are,

Trillions	Billions	Millions	Thousands	Units
Hundred-trillions Ten-trillions Trillions	Hundred-billions Ten-billions Billions	Hundred-millions Ten-millions Millions	Hundred-thousands Ten-thousands Thousands	Hundreds Tens Units

We very seldom use numbers above millions.

Read each period as if it were a number by itself and then add the name of the period. As, 24, 306, 240. Twenty-four *million*, three hundred six *thousand*, two hundred forty. Use the word *and* between the whole number and the decimal.

Read the decimal as if it were a whole number, then add the name of the place of the right-hand figure.

$0.4=4$ tenths, $0.32=32$ hundredths, $0.306=306$ thousandths, etc. $24.03=$ twenty-four and three hundredths.

Refer to the Numeration Table, and read the number given there.

Read the following numbers, referring to the Numeration Table if necessary:

2	248,629	485.65
44	4,804,232	4,768.054
825	56,875,084	2,002.4028
7,286	250,428,376	2.8
18,427	4,775,842,205	909.909
10,010.02		20,904.0904
405,000.405		402,300.24025
1,250.6485		34,008.00012
508.00406		3,468,000.0603
800,001.024		240,027.4206

Write in figures:

1. Sixty-seven thousand, four hundred.
2. Forty-four million, three hundred six thousand, forty-two.
3. Three hundred and three thousandths.
4. Fifteen thousand, three hundred and ten hundredths.
5. Eight hundred twenty-five and seven tenths.
6. Two thousand two and seven hundredths.
7. Ten thousand ten and seven thousandths.
8. Five thousand forty-seven hundred-thousandths.
9. One hundred twenty-three million, three hundred fifty-six thousand, four hundred eighty-eight.
10. Five million, four thousand sixty-three and twenty-four millionths.

The Romans used seven letters to represent numbers:

I	V	X	L	C	D	M
1,	5,	10,	50,	100,	500,	1000

All other numbers are expressed by writing two or more of these letters side by side.

When a letter is repeated, its value is repeated:

III=3, XX=20, CCC=300

When a letter, or a combination of letters, is placed after one of greater value, their sum is expressed:

VII=7, XV=15, XVII=17

When a letter of less value is written before one of greater value, their difference is expressed:

$$IV=4, \quad XL=40, \quad XC=90$$

When a bar is placed over a letter, its value is multiplied by 1000:

$$\overline{V}=5000, \quad \overline{XIV}=14,000$$

I	1	XI	11	XXI	21	D	500
II	2	XII	12	XXX	30	DC	600
III	3	XIII	13	XL	40	DCC	700
IV	4	XIV	14	L	50	DCCC	800
V	5	XV	15	LX	60	CM	900
VI	6	XVI	16	LXX	70	M	1000
VII	7	XVII	17	LXXX	80	MM	2000
VIII	8	XVIII	18	XC	90	$\overline{IV}$	4000
IX	9	XIX	19	C	100	$\overline{V}$	5000
X	10	XX	20	CC	200	$\overline{IX}$	9000

Write in figures the following:

XXIX

CIX

LXIV

MCMXI

XLV

CCXIX

LXXV

MCMIV

LXXVI

MXCV

MDCV

 $\overline{XDLII}$

DXC

XXXIX

MCH

 $\overline{CDCC}$

XCIV

DCXC

DCCX

DLIV

ADDITION.

Addition is the process of finding the *sum* of two or more numbers of the same kind.

The *sign* of addition is $+$, and is read *plus*.

The child should be taught the numbers through 10, and drilled until he responds automatically to any combination.

Primary ideas of numbers and of operations should be gained from objects, but gradually the objects should be eliminated as the pupil progresses in his knowledge of number.

The following combinations should be thoroughly mastered as a foundation for effective work in arithmetic:

$$2+0=2$$

$$4+0=4$$

$$5+0=5$$

$$6+0=6$$

$$1+1=2$$

$$3+1=4$$

$$4+1=5$$

$$5+1=6$$

$$2+2=4$$

$$3+2=5$$

$$4+2=6$$

$$1+3=4$$

$$2+3=5$$

$$3+3=6$$

$$3+0=3$$

$$1+4=5$$

$$2+4=6$$

$$2+1=3$$

$$1+5=6$$

$$1+2=3$$

$7+0=7$	$8+0=8$	$9+0=9$	$10+0=10$
$6+1=7$	$7+1=8$	$8+1=9$	$9+1=10$
$5+2=7$	$6+2=8$	$7+2=9$	$8+2=10$
$4+3=7$	$5+3=8$	$6+3=9$	$7+3=10$
$3+4=7$	$4+4=8$	$5+4=9$	$6+4=10$
$2+5=7$	$3+5=8$	$4+5=9$	$5+5=10$
$1+6=7$	$2+6=8$	$3+6=9$	$4+6=10$
	$1+7=8$	$2+7=9$	$3+7=10$
		$1+8=9$	$2+8=10$
			$1+9=10$

Drill chart in addition where sums do not exceed 10:

$\begin{array}{r} 2 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 3 \\ \hline \end{array}$
$\begin{array}{r} 6 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 1 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 9 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 8 \\ 1 \\ \hline \end{array}$
$\begin{array}{r} 2 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 7 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 5 \\ \hline \end{array}$
$\begin{array}{r} 5 \\ 1 \\ \hline \end{array}$	$\begin{array}{r} 4 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 6 \\ 2 \\ \hline \end{array}$	$\begin{array}{r} 5 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 3 \\ 3 \\ \hline \end{array}$

The teacher may point to any one of the combinations, requiring the pupil to answer promptly. Or the pupil may be asked to give the sums in a certain column from left to right, or from top to bottom.

Our system of numbers is a decimal system, and therefore in teaching the addition of numbers whose sum exceeds 10, as $7+5$, we think that 3 added to 7 makes 10; hence

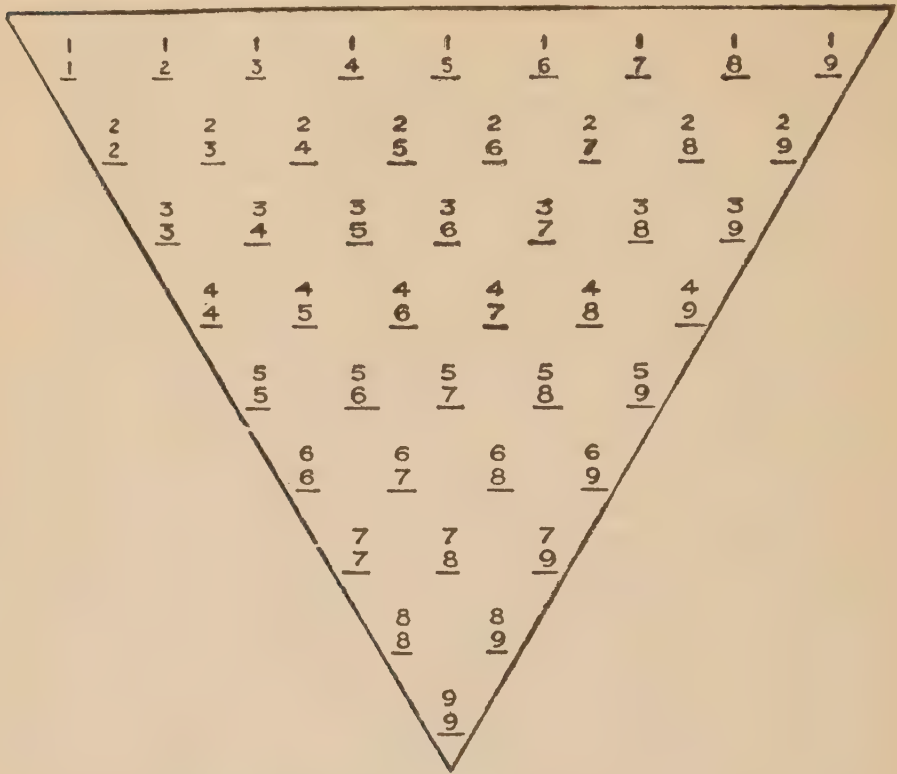
$$7+5=7+3+2=12$$

$$8+7=8+2+5=15$$

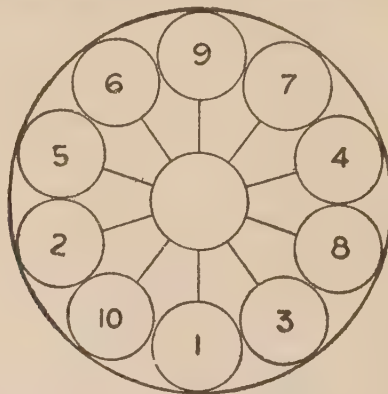
$$6+8=6+4+4=14$$

Much practice in this work will give a pupil great power in dealing with all numbers, and it will emphasize our decimal system.

The following chart gives every possible combination of the digits:



For rapid work in addition. Let the teacher write any number in the center circle. Pupils should promptly give the sum of the center figure and one of the outer figures to which the teacher may point.



Change the center figure often.

Add rapidly by lines and columns:

$$\begin{array}{r}
 8 + 5 + 3 + 4 + 6 = \\
 5 + 4 + 6 + 9 + 2 = \\
 2 + 7 + 8 + 5 + 4 = \\
 3 + 9 + 4 + 6 + 8 = \\
 7 + 4 + 5 + 7 + 3 = \\
 4 + 6 + 7 + 8 + 2 = \\
 \hline
 + \quad + \quad + \quad + \quad =
 \end{array}$$

A chart like the above demands the pupils' close attention and ready response, if the teacher will point to a series of numbers in rapid succession.

Objective work in addition after 10 has been taught, should gradually give way to method.

Three classes of examples should be taught:

1. Where the sum of the units is less than 10,
as $22+4$; $33+5$; $64+3$, etc.
2. Where the sum of the units exactly equals 10,
as $22+8$; $33+7$; $64+6$, etc.
3. Where the sum of the units exceeds 10,
as $22+9$; $33+8$; $64+9$, etc.

Extend this work to numbers of more than two places in exactly the same way, emphasizing method of work.

428	486	596	482	825	645
351	214	678	675	642	547
				725	826
779	700	1274			

Add 425 In adding long columns it is often found convenient to
638 write the sum of each column, placing the right-hand figure
764 under the column added.

825 In case of error, it enables one to find the mistake with
655 less difficulty.

$$\begin{array}{r}
 124 \\
 31 \\
 20 \\
 32 \\
 \hline
 3431
 \end{array}$$

A help to accuracy.

$$\begin{aligned}
 &32+17+77+8+27+73+80+64+18= \\
 &47+31+43+32+78+47+7+72+92= \\
 &8+92+1+41+19+69+51+87+5= \\
 &19+67+5+9+35+49+93+44+14= \\
 &67+13+54+6+62+17+67+31+30= \\
 &98+71+30+80+30+9+13+47+75= \\
 &27+10+97+33+73+16+81+39+62= \\
 &80+9+83+42+17+8+63+33+27= \\
 &63+83+17+87+24+37+5+64+82=
 \end{aligned}$$

$$+ + + + + + + + =$$

Add the above by columns and by lines.

Prove by comparing the sum total of the columns with the sum total of the lines.

EXERCISE 1.

Sales of a department store for the week ending September 30, 1911.

Days.	Dry Goods.	Boots and Shoes.	Furniture.	Kitchen Utensils.	Groceries.	Total.
Monday.....	\$89.53	\$40.75	\$25.65	\$41.58	\$27.35	
Tuesday.....	91.40	19.60	80.75	38.15	21.17	
Wednesday....	53.35	39.10	63.48	52.19	33.41	
Thursday.....	65.20	24.70	15.90	23.63	19.05	
Friday.....	21.14	20.50	31.80	18.77	15.46	
Saturday.....	93.27	61.90	26.50	25.54	54.93	
Total.....						

Copy and complete the above statement. Prove by adding the vertical and horizontal totals.

EXERCISE 2.

Add vertically and horizontally the following statement of four weeks' cash receipts, February, 1909:

	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Total.
1st....	\$1068.17	\$ 876.79	\$ 729.17	\$ 297.16	\$ 98.09	\$1119.44	
2nd....	987.26	749.02	813.65	361.19	407.63	1506.38	
3rd....	995.35	936.95	657.98	416.41	336.41	1324.75	
4th.... Feb. 22	1458.18	999.91	397.17	501.28	1207.67		
Total..							

SUBTRACTION.

Subtraction is the process of taking one number from another.

The terms used are the *minuend*, *subtrahend*, and *remainder*.

The *minuend* is the larger number, the number to be diminished.

The *subtrahend* is the smaller number, the number to be subtracted, or taken away.

The *remainder* is the difference between the minuend and the subtrahend.

The *sign* of subtraction is —, and is read *minus*.

The objective work in subtraction is carried along with the addition work.

As, $6+3=9$.

9 take away 3=6.

9 take away 6=3.

6 and how many more make 9?

3 and how many more make 9?

A drill chart for subtraction of numbers up to 20.

3	7	4
6		8
2	9	5

Any number from 10 to 20 may be written in the center space, and changed often to vary the drill.

What must be added to the outside number to give the center number?

The pupil should take the number pointed out, think how many must be added to it to make 10, and add to this last number the difference between the center number and 10.

Thus, if 7 is the number pointed out, and 18 is the center number, $3+8$ will be the answer=11.

Repeated drill requiring pupils to think numbers at once by use of the decimal system, will prepare the way for quick and accurate work later.

Method of work.

From 457 take 268.

457
268
—

Write the subtrahend under the minuend.

189 Begin with the units to subtract.

We cannot take 8 units from 7 units, so we take 1 ten from the 5 tens (leaving 4 tens) and add it to the 7 units, making 17 units. We can now take 8 units from 17 units, leaving 9 units.

In like manner we cannot take 6 tens from 4 tens, so we take 1 hundred from the 4 hundreds (leaving 3 hundreds) and add it to the 4 tens, making 14 tens.

We can now take 6 tens from 14 tens, leaving 8 tens.

2 hundreds from 3 hundreds leaves 1 hundred.

Thus the difference is 189.

In doing the example the pupil thinks:—8 from 17 leaves 9; 6 from 14 leaves 8; 2 from 3 leaves 1.

Proof.—Add the remainder to the subtrahend. The sum should equal the minuend.

THE AUSTRIAN METHOD.

The Austrian method of subtraction emphasizes not so much what remains after taking the subtrahend from the minuend, as what must be added to the subtrahend to make the minuend.

This is also called the “shop” method, as it is generally employed in making change. Much practice along this line is recommended.

From 697 subtract 284.

697 By the Austrian method we say 4 units and 3 units=7 units.
284 Write 3 in the units' place. 8 tens and 1 ten=9 tens. Write 1 in
— tens' place. 2 hundreds and 4 hundreds=6 hundreds. Write 4 in
413 hundreds' place, and the result is 413.

From 457 take 268.

457 The pupil should be guided to say 8 units and 9 units=17
268 units. Put down 9. 6 tens and 1 ten are 7 tens and 8 tens=15
— tens. Put down 8. 2 hundreds and 1 hundred are 3 hundreds
189 and 1 hundred=4 hundreds. Put down 1, and the result is 189.

Add ten to each minuend digit that is smaller than the corresponding subtrahend digit, and make up for that by adding one to the next higher subtrahend digit.

EXERCISE 3.

Use the Austrian method in the following:

- | | |
|-------------|-------------|
| 1. 1272—631 | 5. 1424—836 |
| 2. 1486—745 | 6. 1679—486 |
| 3. 2472—864 | 7. 3492—875 |
| 4. 1370—837 | 8. 1620—952 |

A man bought a lamp for 57c and gave the store-keeper a dollar bill. What change did the store-keeper return, giving as few pieces of money as possible?

He will give 3 cents, a nickel, a dime, and a quarter-dollar. The pupil will do his mental work in the following manner: 57 cents, 60 cents, 65 cents, 75 cents, 1 dollar.

Make change in the following examples, using as few pieces of money as possible:

Amount of sale.	Money paid.
1. 29c	Half-dollar.
2. 37c	Quarter-dollar and 2 dimes.
3. 62c	Dollar.
4. 59c	Half-dollar and quarter-dollar.
5. \$ 1.24	\$2 bill.
6. \$ 2.73	\$5 bill.
7. \$ 3.78	\$10 bill.
8. \$ 2.14	\$2 bill and \$1 bill.
9. \$ 1.16	\$1 bill and half-dollar.
10. \$24.30	\$20 bill and \$10 bill.

Drill in Addition or Subtraction.

9	23	48	27	92	59	16	64	93
20	44	35	88	54	66	55	36	76
52	97	26	19	63	79	83	74	37
61	94	73	82		49	69	39	18
78	47	68	28		17	77	45	89
12	34	25	65	22	58	15	38	67
21	46	84	43	96	75	29	85	50
13	57	53	95	24	87	33	56	14

9. What must be added to the sum of \$320.50 and \$165.25 to make \$510?

10. The sum of two numbers is 154,682, and the greater number is 96,247. What is the less number?

MULTIPLICATION.

Multiplication is the process of taking one number as many times as there are units in another.

The terms used are *multiplicand*, *multiplier* and *product*.

The *multiplicand* is the number to be multiplied.

The *multiplier* is the number by which we multiply.

The *product* is the result of the multiplication.

The *sign* of multiplication is $\times$, and is read **times**.

The product of two numbers is the same whichever is made the multiplier.

The multiplier must always be an abstract number.

The multiplicand may be either an abstract or a concrete number.

The product will always be of the same denomination as the multiplicand.

A thorough knowledge of the multiplication tables is absolutely necessary.

$1 \times 1 = 1$	$2 \times 1 = 2$	$3 \times 1 = 3$	$4 \times 1 = 4$	$5 \times 1 = 5$
$1 \times 2 = 2$	$2 \times 2 = 4$	$3 \times 2 = 6$	$4 \times 2 = 8$	$5 \times 2 = 10$
$1 \times 3 = 3$	$2 \times 3 = 6$	$3 \times 3 = 9$	$4 \times 3 = 12$	$5 \times 3 = 15$
$1 \times 4 = 4$	$2 \times 4 = 8$	$3 \times 4 = 12$	$4 \times 4 = 16$	$5 \times 4 = 20$
$1 \times 5 = 5$	$2 \times 5 = 10$	$3 \times 5 = 15$	$4 \times 5 = 20$	$5 \times 5 = 25$
$1 \times 6 = 6$	$2 \times 6 = 12$	$3 \times 6 = 18$	$4 \times 6 = 24$	$5 \times 6 = 30$
$1 \times 7 = 7$	$2 \times 7 = 14$	$3 \times 7 = 21$	$4 \times 7 = 28$	$5 \times 7 = 35$
$1 \times 8 = 8$	$2 \times 8 = 16$	$3 \times 8 = 24$	$4 \times 8 = 32$	$5 \times 8 = 40$
$1 \times 9 = 9$	$2 \times 9 = 18$	$3 \times 9 = 27$	$4 \times 9 = 36$	$5 \times 9 = 45$
$1 \times 10 = 10$	$2 \times 10 = 20$	$3 \times 10 = 30$	$4 \times 10 = 40$	$5 \times 10 = 50$
$6 \times 1 = 6$	$7 \times 1 = 7$	$8 \times 1 = 8$	$9 \times 1 = 9$	$10 \times 1 = 10$
$6 \times 2 = 12$	$7 \times 2 = 14$	$8 \times 2 = 16$	$9 \times 2 = 18$	$10 \times 2 = 20$
$6 \times 3 = 18$	$7 \times 3 = 21$	$8 \times 3 = 24$	$9 \times 3 = 27$	$10 \times 3 = 30$
$6 \times 4 = 24$	$7 \times 4 = 28$	$8 \times 4 = 32$	$9 \times 4 = 36$	$10 \times 4 = 40$
$6 \times 5 = 30$	$7 \times 5 = 35$	$8 \times 5 = 40$	$9 \times 5 = 45$	$10 \times 5 = 50$
$6 \times 6 = 36$	$7 \times 6 = 42$	$8 \times 6 = 48$	$9 \times 6 = 54$	$10 \times 6 = 60$
$6 \times 7 = 42$	$7 \times 7 = 49$	$8 \times 7 = 56$	$9 \times 7 = 63$	$10 \times 7 = 70$
$6 \times 8 = 48$	$7 \times 8 = 56$	$8 \times 8 = 64$	$9 \times 8 = 72$	$10 \times 8 = 80$
$6 \times 9 = 54$	$7 \times 9 = 63$	$8 \times 9 = 72$	$9 \times 9 = 81$	$10 \times 9 = 90$
$6 \times 10 = 60$	$7 \times 10 = 70$	$8 \times 10 = 80$	$9 \times 10 = 90$	$10 \times 10 = 100$

The multiplication tables may be extended beyond 10, but for ^{practical} practical and immediate use it is quite as well to stop at 10.

The facts of multiplication as found in the tables should be thoroughly memorized.

Have children add by numbers: as, 7, 14, 21, 28, etc., 9, 18, 27, 36, etc.

Good drill,—

$$4 \times 6 + 2 \quad 7 \times 5 - 6$$

$$3 \times 8 + 5 \quad 8 \times 4 - 3$$

Method of work.

Multiply 428 by 536.

428

536

2568	428×6 units	=	2568 units
1284	428×3 tens	=	1284 tens
2140	428×5 hundreds	=	2140 hundreds
229,408	428×536	=	229408 units

Place the right-hand figure of each partial product under the figure of the multiplier which produces it.

Multiply 4862 by 4006.

4862	When there are ciphers in the multiplier it is not neces-
4006	sary to multiply by them. Keep in mind that the first figure
-----	of each partial product is to be written directly under the
29172	figure of the multiplier which produces it. This saves the
19448	work of writing the row of 0's.

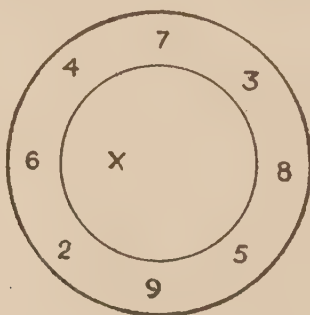
19,477,172.

Multiply 482 by 10; 482 by 100.

482	482	If the multiplier is 10, annex one cipher to the mul-
10	100	tiplicand; if 100, annex 2 ciphers, etc.

4,820 48,200

The following drill will help fix in the mind the facts of the multiplication table.



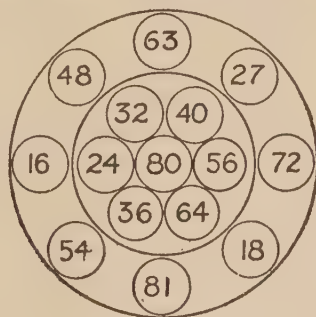
Draw the diagram on the blackboard. Frequently change the centre number. Let the teacher or some pupil point to a number in the outer rim, requiring the children to give at once the product.

Drill in multiplication.

50	6	10	7	3	9	5	12	2	8	11	1	4	20
4													
7													
2													
5													
8													
3													
9													
1													
6													
12													
10													
11													
40													

Pupils should copy and fill in vacant squares, using numbers in vertical column as multipliers.

The following drill is effective in securing the desired quickness, as pupils make use of facts learned in the multiplication tables.



Let the pupil tell the multiplier and multiplicand as the teacher points to the numbers.

For example, the teacher points to 36, the pupil answers 6×6 and 4×9 .

EXERCISE 5.

Find the product:

- | | | |
|---------------------|----------------------|-------------------------|
| 1. 895×789 | 8. 432×560 | 15. 94086×5761 |
| 2. 873×597 | 9. 630×480 | 16. 75486×4080 |
| 3. 764×854 | 10. 508×680 | 17. 50695×5408 |
| 4. 578×806 | 11. 970×806 | 18. 40046×7008 |
| 5. 786×908 | 12. 405×706 | 19. 87654×5050 |
| 6. 607×407 | 13. 430×403 | 20. 21452×8070 |
| 7. 502×750 | 14. 145×200 | 21. 31805×7500 |

EXERCISE 6.

- What is the value of 82 tons of hay at \$18.75 per ton?
- If it cost \$35,868 to build a mile of railroad, what will it cost to build 38 miles?
- At the rate of 52 bushels per acre, how much corn can be raised on 372 acres of land?
- A real estate company bought 75 acres of land at \$62.50 per acre, and 54 acres at \$78 per acre. They sold the whole at \$75.25 per acre. How much did they gain or lose?
- A grain dealer bought 5872 bushels of wheat in Chicago at 59c a bushel and shipped it to Boston at a cost of 3c per bushel. He sold it in Boston for 68c per bushel. What was his gain?

DIVISION.

Division is the process of finding how many times one number is contained in another.

The terms used are the *dividend*, *divisor*, *quotient*, and *remainder*.

The *dividend* is the number divided.

The *divisor* is the number by which we divide, and shows the size of each part.

The *quotient* is the result, and shows the number of equal parts.

The *remainder* is the part of the dividend left.

The *sign* of division is $\div$, and is read *divided by*.

The divisor and quotient are factors (makers) of the dividend.

Thus to prove division, we multiply the divisor by the quotient, and to the product we add the remainder, if there is one. The result should be the dividend.

Division may be expressed in the following ways:

$$\begin{array}{r} 5 \\ 4 \overline{)20} \end{array} \quad \text{usual form.}$$

$$20 \div 4 = 5 \quad \text{using the sign.}$$

$$\frac{20}{4} = 5 \quad \text{fractional form.}$$

$$20:4 \quad \text{ratio method.}$$

Dividing a number into two equal parts is the same as finding one-half ($\frac{1}{2}$) of it.

Dividing a number into three equal parts is the same as finding one-third ($\frac{1}{3}$) of it.

So in the following drill, dividing the numbers in the outer rings by 6, 8, 9, is the same as finding one-sixth ($\frac{1}{6}$), one-eighth ($\frac{1}{8}$), one-ninth ($\frac{1}{9}$) of them.

These diagrams should be placed upon the board, and as the teacher or some pupil points to a number in the outer ring, the pupils should give the quotient quickly and correctly.



SHORT DIVISION.

Short division is simple and the method of work is readily learned.

Divide 8527 by 9.

85 hundreds $\div 9 = 9$ hundreds and 4 hundreds remaining;
 $9 \overline{)8527}$ we write 9 over the hundreds' column. 4 hundreds and 2 tens
 $= 42$ tens; 42 tens $\div 9 = 4$ tens and 6 tens remaining; we
 write 4 over the tens' column. 6 tens and 7 units $= 67$ units;
 67 units $\div 9 = 7$ units and 4 units remaining; we write 7 over the units'
 column, and the remainder 4 over the divisor 9 with a line between, to
 show that 4 is still to be divided by 9.

Give a great many examples like the above. It is one of the best mental drills, and prepares the way for long division.

Much of the slow, inaccurate work in arithmetic is due to a lack of drill along the line of multiplication and division.

To prove an example in division, multiply the quotient by the divisor, and add the remainder, if there is one.

EXERCISE 7.

Divide and prove the following:

- | | | | |
|--------------------------|--------------------------|--------------------------|---------------------------|
| 1. $6\overline{)568}$ | 7. $7\overline{)4732}$ | 13. $5\overline{)5263}$ | 19. $9\overline{)6248}$ |
| 2. $8\overline{)9655}$ | 8. $4\overline{)2116}$ | 14. $3\overline{)2004}$ | 20. $6\overline{)5084}$ |
| 3. $9\overline{)15432}$ | 9. $5\overline{)24806}$ | 15. $7\overline{)19019}$ | 21. $4\overline{)49048}$ |
| 4. $7\overline{)98746}$ | 10. $6\overline{)85429}$ | 16. $8\overline{)34702}$ | 22. $3\overline{)15161}$ |
| 5. $10\overline{)76482}$ | 11. $9\overline{)46681}$ | 17. $5\overline{)84763}$ | 23. $2\overline{)14631}$ |
| 6. $8\overline{)200416}$ | 12. $6\overline{)15116}$ | 18. $7\overline{)34816}$ | 24. $4\overline{)648161}$ |

LONG DIVISION.

Divide 8401 by 31.

The process of long division is the same as that of short division, except that in long division we express the successive partial dividends.

62 We find the quotient figure by comparing the first one, or
the first two dividend figures with the first divisor figure.

220 In the above example:

217 3 is contained in 8, 2 times.

— 3 is contained in 22, 7 times.

31 3 is contained in 3, once.

31 Thus the quotient is 271.

— Always place the quotient figure directly over the dividend
0 figure that produced it.

Divide 8401 by 82.

Examples where we have zero in the quotient often give trouble.

102 $\frac{37}{2}$ Practice, however, does away with the difficulty.
82)8401 We find in the above example that 82 from 84 leaves a
82 remainder of 2: bring down the 0. We see that 82 is not
— contained in 20; write 0 in the quotient directly over the
201 dividend figure which was last brought down, and bring
164 down the next figure 1. 82 is contained in 201 twice. Thus
— the quotient is 102 with a remainder of 37.
37 remainder.

If after bringing down another figure the divisor is still larger than the partial dividend, write another 0 in the quotient, and bring down the next quotient figure.

Divide 8401 by 39.

$$\begin{array}{r}
 215\overset{16}{\underset{39}{3}} \\
 39 \overline{) 8401} \\
 \underline{78} \\
 60 \\
 \underline{39} \\
 211 \\
 \underline{195} \\
 16 \text{ remainder.}
 \end{array}$$

This example differs from the preceding examples in that the second divisor figure is a large number. 39 is so much nearer 40 than 30, we must find the quotient figures by comparing the first one or first two dividend figures with 4 as a trial divisor rather than 3.

4 is contained in 8, 2 times.

4 is contained in 6, once.

4 is contained in 21, 5 times.

Thus the quotient is 215 with a remainder of 16.

In general, if the second divisor figure is 1, 2, or 3, the first divisor figure is the trial divisor. If the second divisor figure is 7, 8, or 9, the trial divisor should be one more than the first divisor figure. If the second divisor figure is 4, 5, or 6, the trial divisor may be the first divisor figure, or one more than the first divisor figure.

Practice will show.

First. If the product is greater than the partial dividend, the quotient figure is too large.

Second. If the remainder is greater than the divisor, the quotient figure is too small.

Divide 26,874 by 44.

$$\begin{array}{r}
 610\overset{3}{\underset{4}{4}} \\
 44 \overline{) 26874} \\
 \underline{264} \\
 47 \\
 \underline{44} \\
 34 \text{ remainder.}
 \end{array}$$

In an example of this kind care must be taken not to omit the last 0 in the quotient.

$$8752 \div 10 = 875 \text{ and } 2 \text{ remainder.}$$

$$8752 \div 100 = 87 \text{ and } 52 \text{ remainder.}$$

$$8752 \div 1000 = 8 \text{ and } 752 \text{ remainder.}$$

A number may be divided by 10, 100, 1000, etc., by cutting off as many dividend figures from the right, as there are ciphers on the right of the divisor. The figures cut off will be the remainder, the rest will be the quotient.

$$12,000 \div 30 \text{ is the same as } 1200 \div 3.$$

Cutting off the same number of ciphers from the right of both dividend and divisor, does not change the quotient.

EXERCISE 8.

- | | |
|---------------------|-------------------------|
| 1. $9072 \div 21$ | 16. $68748 \div 68$ |
| 2. $22050 \div 42$ | 17. $195702 \div 78$ |
| 3. $44667 \div 63$ | 18. $291388 \div 97$ |
| 4. $10086 \div 82$ | 19. $15249 \div 39$ |
| 5. $39831 \div 51$ | 20. $435888 \div 48$ |
| 6. $29756 \div 43$ | 21. $143278 \div 142$ |
| 7. $29757 \div 91$ | 22. $267167 \div 369$ |
| 8. $29408 \div 32$ | 23. $1056852 \div 525$ |
| 9. $60152 \div 73$ | 24. $1686656 \div 395$ |
| 10. $22356 \div 81$ | 25. $2489592 \div 406$ |
| 11. $3074 \div 29$ | 26. $1217958 \div 1234$ |
| 12. $33630 \div 57$ | 27. $3839112 \div 4506$ |
| 13. $15466 \div 38$ | 28. $2875166 \div 574$ |
| 14. $79344 \div 87$ | 29. $4189510 \div 6253$ |
| 15. $32046 \div 49$ | 30. $1537763 \div 5009$ |

EXERCISE 9.

- 24 tons of hay cost \$432. What is the price per ton?
- How many cows at \$42 a head, will \$36,750 buy?
- The weekly wages of 110 men are \$1320. How much per day does each man receive?
- If I receive \$80 and spend \$50 per month, in how many years of 12 months each shall I save \$2,880?
- If the divisor is 16, the quotient 42, and the remainder 11, what is the dividend?
- A farmer produces 19,592 bushels of corn from 316 acres of land. What is the average yield per acre?
- A man sells two houses at \$4,350 each. With the proceeds he buys land at \$75 per acre. How many acres does he buy?
- If a man pays \$24 rent a month, in how many years of 12 months each will he pay \$3,546 rent?
- A man paid \$327 for a mowing machine and hired help to run it at \$4.50 per day. He let the machine at \$7.50 per day, including the help he hired. How many days must he let the machine to pay its first cost?
- Mr. Jackson bought 22 cords of wood for \$132. For how much per cord must he sell it to gain \$44 on the whole?

DECIMAL FRACTIONS.

Decimal fractions, usually called decimals, express one or more of the decimal divisions of a unit. Decimal fractions are generally expressed by writing the numerator only, the denominator being shown by the position of the decimal point, as illustrated by the following:

.4	four tenths.
.04	four hundredths.
.004	four thousandths.
.0004	four ten-thousandths.
.00004	four hundred-thousandths.
.000004	four millionths.

Read the decimal as if it were a whole number, then add the name of the place of the right-hand figure.

A whole number with a decimal is called a mixed decimal.

In reading a mixed decimal, use the word *and* between the whole number and the decimal.

Much drill in reading and writing decimals is desirable.

Read the following:

.408	.0050	32.037	.000058
.0506	.00401	20.070	.000506
.0458	.02000	9.009	.002600

Express the following in decimal form:

$\frac{3}{10}$	$\frac{5}{10}$	$\frac{45}{100}$	$\frac{62}{100}$	$\frac{320}{1000}$	$\frac{475}{1000}$	$8\frac{4}{10}$	$32\frac{4}{100}$
7 tenths			425 thousandths			8 and 6 tenths	
8 hundredths			62 thousandths			12 and 6 hundredths	
32 hundredths			6 thousandths			15 and 6 thousandths	

ADDITION AND SUBTRACTION OF DECIMALS.

Use same method as in whole numbers.

Arrange units of the same order in the same column.

Keep the decimal points one under another.

Place the decimal point in the answer directly under the decimal points in the example.

EXERCISE 10.

Addition:

1. $2.457 + 3.576 + 8.01 + .4592 + 82.4070$
2. $9.423 + 732.01 + 62. + 8.4067 + 4.04863$
3. $24.84 + 8.531 + .4004 + 6.07$
4. $14.4278 + 3.042 + 2.0046 + .8795 + 3.6745 + .297$
5. $2.243 + 5.1462 + 3.0481 + .72546 + .04652$

Subtraction:

- | | |
|--------------------|--------------------|
| 6. 624.278—125.564 | 14. 606.48—288.09 |
| 7. 863.581—132.472 | 15. .8—.08 |
| 8. 145.6—64.58 | 16. 65.800—19.014 |
| 9. 6.02—2.006 | 17. 12.001—9.00046 |
| 10. 2.308—.0024 | 18. .4875—.22 |
| 11. 4.4—.62 | 19. .0375—.0028 |
| 12. 14.08—1.846 | 20. 27.475—1.866 |
| 13. .06—.025 | |

MULTIPLICATION OF DECIMALS.

To multiply a decimal by 10, move the decimal point one place to the right.

To multiply a decimal by 100, move the decimal point two places to the right.

Multiply the following by 10, by 100, and by 1000 by moving the decimal point.

.4	.046	.0085	.485
.25	.845	.062	.0628
.405	.476	.0486	.0082

Multiply 2.375 by 600.

237.5 First multiply the multiplicand by 100 by moving the decimal point two places to the right. Then multiply by 6.

1425.0 To multiply a decimal by a whole number, multiply as with whole numbers, and then point off as many places in the product as the multiplicand has decimal places.

EXERCISE 11.

- | | |
|-------------------------|--------------------------|
| 1. 4.856×400 | 5. 261.1×7200 |
| 2. 5.408×3200 | 6. 34.0062×9000 |
| 3. 64.042×2000 | 7. 100.65×1200 |
| 4. 184.64×600 | 8. $.0048 \times 8000$ |

Multiply 36.4 by .6.

36.4 This means to find $\frac{6}{10}$ of 36.4.
 6 $\frac{1}{10}$ of 36.4 = 3.64.
 21.84 $\frac{6}{10} = 6 \times 3.64 = 21.84.$

To multiply a decimal by a decimal, multiply as with whole numbers and point off as many decimal places in the product as there are in both multiplicand and multiplier together.

EXERCISE 12.

- | | |
|-------------------------|-------------------------|
| 1. 4.878×3.816 | 6. $.0101 \times 6.06$ |
| 2. 67.50×1200 | 7. $4.072 \times .004$ |
| 3. 1.008×4.004 | 8. 16.32×2.020 |
| 4. $.047 \times .75$ | 9. $.1672 \times 6.204$ |
| 5. 6.004×3.07 | 10. $72.04 \times .09$ |

DIVISION OF DECIMALS.

To divide a decimal by 10, move the decimal point one place to the left.

To divide a decimal by 100, move the decimal point two places to the left.

Divide the following by 10, by 100, by 1000, by moving the decimal point:

.4	1.406	8.04	75.06
.25	24.08	6.003	54.04
.405	.5825	.62	112.5

Divide 601.26 by 600.

First divide the dividend by 100 by moving the decimal point two places to the left, then divide by 6, placing the decimal point in the quotient directly over the decimal point in the dividend.

$$\begin{array}{r} 1.0021 \\ 6 \overline{) 6.0126} \end{array}$$

EXERCISE 13.

- | | |
|-----------------------|----------------------|
| 1. $74.40 \div 60$ | 5. $46.40 \div 40$ |
| 2. $680.4 \div 4200$ | 6. $43.2 \div 2400$ |
| 3. $128. \div 800$ | 7. $24.64 \div 1100$ |
| 4. $15540. \div 7000$ | 8. $9. \div 600$ |
- $8 \div 4 = 2$.

Multiply both dividend and divisor by 2.

$16 \div 8 = 2$ and the quotient is the same.

Multiplying both dividend and divisor by the same number does not change the quotient.

This is a most valuable principle to remember, and it is used in the following examples:

Divide 1.806 by .43.

$$\begin{array}{r} .43 \overline{) 1.806} \\ \underline{1.72} \\ 86 \\ \underline{86} \\ 0 \end{array}$$

Multiply both dividend and divisor by 100 by moving the decimal point two places to the right. This makes the divisor a whole number. Place the decimal point in the quotient directly over the decimal point thus established in the dividend.

Divide 6.4938 by .242.

$$\begin{array}{r}
 26.833 \\
 .242 \overline{) 6.4938} \wedge 800 \\
 \underline{484} \\
 1653 \\
 \underline{1452} \\
 2018 \\
 \underline{1936} \\
 820 \\
 \underline{726} \\
 940 \\
 \underline{726}
 \end{array}$$

Multiply both dividend and divisor by 1000 by moving the decimal point three places to the right, thus making the divisor a whole number.

When the dividend does not contain the divisor evenly, add ciphers and continue to divide.

Ciphers added to the right of a decimal point do not change the value of a number.

Three decimal places in the quotient are usually sufficient.

EXERCISE 14.

- | | |
|--------------------------|--------------------------|
| 1. $86.07 \div 28.5$ | 13. $1.0764 \div .023$ |
| 2. $175.552 \div 4.16$ | 14. $.0368 \div .0004$ |
| 3. $2.5956 \div 72.1$ | 15. $447.12 \div 4.86$ |
| 4. $28.764 \div 9.4$ | 16. $.08244 \div .018$ |
| 5. $3398.448 \div 84.12$ | 17. $3.71027 \div .807$ |
| 6. $10.625 \div .25$ | 18. $53.4404 \div 62.14$ |
| 7. $17.4216 \div 8.54$ | 19. $.27468 \div .0042$ |
| 8. $469.872 \div 4.68$ | 20. $.7140 \div .4200$ |
| 9. $.5750 \div .046$ | 21. $59.7408 \div 7.84$ |
| 10. $5328.96 \div 62.4$ | 22. $.12012 \div .0182$ |
| 11. $.3856 \div .004$ | 23. $.04925 \div .005$ |
| 12. $8.194 \div 96.4$ | 24. $.0005 \div 5000$ |

EXERCISE 15.

What is the cost of

- 8200 shingles at \$3.75 per thousand?
- 4875 pounds of coal at \$6.75 per ton? (2000 lb. = 1 ton).
- 5750 envelopes at \$1.37 per thousand?
- 12832 railroad ties at \$14.75 per hundred?
- 972 feet of lumber at \$22.75 per thousand?
- 8725 feet of lumber at \$28.50 per thousand?
- 3375 laths at $22\frac{1}{2}c$ per hundred?
- 4860 bricks at \$8.95 per thousand?
- 382 pounds of pork at \$9.75 per hundred?
- 6485 pounds of coal at \$7.25 per ton?
- 3840 feet of boards at \$35 per thousand?
- 4840 chestnut rails at \$3.95 per hundred?

EXERCISE 16.

Miscellaneous problems.

1. A farmer raised 6750 bushels of corn from 150 acres of land, at an average of \$6.35 per acre. How much will he gain if he sells the whole at 24c per bushel?

2. For how much coal at \$6.75 per ton, will \$119.50 pay?

3. A real estate dealer bought 78 acres of land for \$3250, and sold it for \$3500.50. How much did he gain per acre?

4. The last reading of my gas meter was 68500 cubic feet. The previous reading was 62800 cubic feet. At \$1.05 a thousand find the amount of my bill.

5. If a boy earns \$5.75 a week, how many weeks will it take him to earn \$281.75?

UNITED STATES MONEY.

10 mills=1 cent (c)

10 dimes=1 dollar (\$)

10 cents=1 dime

10 dollars=1 eagle (E)

The coins of the United States are authorized by law.

They are,—

Gold, the double-eagle, eagle, half-eagle, quarter-eagle.

Silver, the dollar, half-dollar, quarter-dollar, dime.

Nickle, the five-cent piece.

Bronze, the cent.

Paper money in the form of treasury notes, bank notes, gold and silver certificates, is extensively used in place of coins.

The dollar, being the standard unit of value in the United States, is written at the left of the decimal point; dimes, cents, and mills, being tenths, hundredths and thousandths of the dollar, are expressed at the right of the decimal point.

The mill is not coined, but the term is used in speaking of the fractional part of a cent. In business transactions it is customary to regard 5 mills or more as 1 cent, and to omit less than 5 mills.

The terms eagle and dime are not much used. Eagles and dollars are read as dollars, and dimes and cents are read as cents. Thus, \$65.274 is read sixty-five dollars, twenty-seven cents, four mills.

Read the following as dollars, cents, and mills:

\$ 8.436	\$ 42.655	\$ 0.426	\$ 125.048
\$25,406	\$485.722	\$148.329	\$1250.581

BILLS AND ACCOUNTS.

A *bill* is a written statement of goods sold, or services rendered, giving the date of the transactions, the names of the parties, items, cost of each, and the amount of the whole.

An *account* is the record of business transactions between two parties.

The *debtor* (Dr.) is the person who buys the goods or receives the service.

The *creditor* (Cr.) is the person who sells the goods or renders the service.

A bill becomes a *receipt* when the creditor or his authorized agent writes "Received payment" and signs his name.

Edward Walker bought of Frank Carter & Co., March 5, 1911, 10 bbl. flour at \$7.25, 400 lb. granulated sugar at $4\frac{1}{2}$ c, 60 lb. butter at 30c, 100 lb. tea at 42c. Edward Walker pays for the goods and receives the following receipted bill from Frank Carter & Co.:

Boston, Mass., March 5, 1911.

Mr. Edward Walker.

Bought of Frank Carter & Co.

	10 bbl. flour	@ \$7.25	72 50	
	400 lb. gran. sugar	@ .04 $\frac{1}{2}$	18 00	
	60 lb. butter	@ .30	18 00	
	100 lb. tea	@ .42	42 00	150 50

Received payment,

FRANK CARTER & Co.,

By C. D.

A second form for the above is often used:

Boston, Mass., March 5, 1911.

Mr. Edward Walker.

To Frank Carter & Co., Dr.

This means that Edward Walker is debtor to Frank Carter & Co. for the goods mentioned in the bill.

David Grant sells A. A. Evans, April 2, 1911, 1 bbl. St. Louis flour at \$6.75, 3 lb. currants at 15c. April 8, 1911, 4 lb. Rio coffee at 25c, 3 lb. Smyrna figs at 20c.

April 20, 1911, David Grant pays on account \$5.00.

April 30, 1911, David Grant sells A. A. Evans 5 lb. Vermont butter at 32c, and A. A. Evans brings David Grant $\frac{1}{2}$ cord wood at \$6.50 per cord.

The following illustrates the ledger account of the above transactions as shown on the books of David Grant in account with A. A. Evans:

Dr.		A. A. Evans.		Cr.			
1911			1911				
April	2	1 bbl. St. Louis flour	6 75	April	20	Cash	5 00
		3 lb. currants @.15	45	“	30	1½ cord wood @6.50	3 25
“	8	4 lb. Rio coffee @.25	1 00				
		3 lb. Smyrna figs@.20	60				
“	30	5 lb. Vt. butter @.32	1 60			Balance	2 15
			10 40				10 40
May	1	Balance	2 15				

The difference between the sum of the debits and the sum of the credits is called the *balance*.

The balance is entered on the less side of the account, and makes the footings of the two sides equal.

Entering the balance and the footings, and drawing the proper lines as above, is called *closing* or *balancing the account*.

May 1, 1911, David Grant presents to A. A. Evans his bill, which is settled and receipted as follows:

Trenton, N. J., May 1, 1911.

Mr. A. A. Evans.

To David Grant, Dr.

April	2	1 bbl. St. Louis flour	@ 6.75	6 75	
		3 lb. currants	@ .15	45	
	8	4 lb. Rio coffee	@ .25	1 00	
		3 lb. Smyrna figs	@ .20	60	
	30	5 lb. Vermont butter	@ .32	1 60	10 40
April	20	By cash		5 00	
	30	By 1½ cord wood	@ 6.50	3 25	8 25
		Balance			2 15

Received payment,

DAVID GRANT.

Transactions.

Sept. 4, 1911, William Baxter buys of the Dwight Lumber Co., of Detroit, Michigan, on account

7500 shingles at \$3.50 per M.

1450 ft. pine at \$34.50 per M.

8250 ft. hemlock at \$22.25 per M.

Sept. 20, 1911, Wm. Baxter buys of Dwight Lumber Co. on account

1500 ft. boards at \$24.00 per M.

2750 cedar posts at \$12.50 per C.

Oct. 12, 1911, Wm. Baxter pays \$115 on his account.

Nov. 15, 1911, Wm. Baxter pays \$45 on his account.

Dec. 4, 1911, Wm. Baxter *pays the balance* of his account.

Render an itemized account, Sept. 30, 1911.

Render a statement, Oct. 31, 1911.

Render a statement, Nov. 30, 1911.

Receipt the last statement in full, Dec. 4, 1911.

When payments are made on an account, a receipt is given for the sum paid. The following was given to A. A. Evans:
\$5.00

Trenton, N. J., April 20, 1911.

Received of A. A. Evans, five dollars on account.

DAVID GRANT.

CASH ACCOUNT.

A *cash account* is a record of all money received and paid out.

Put on debit side all money on hand or money received.

Put on credit side all money paid out.

Balance a cash account in the same way as a ledger account.

1911	Cash.	Dr.	Cr.
Jan.	1 Cash on hand	225 00	
	5 Paid insurance		35 00
	10 Received check	74 00	
	18 Paid telephone		3 40
	24 Paid coal bill		48 00
	28 Received salary	195 00	
	Balance on hand		407 60
Feb.	1 Balance brought forward	407 60	

BUSINESS EXERCISES.

Transactions.

Jan. 10, 1911, Frank Brown buys of C. E. Wood, of Chicago, on account,

20 yd. silk at \$1.25.

3 yd. lining at 25c.

$\frac{3}{4}$ yd. lace at \$2.40.

1 doz. men's linen handkerchiefs at \$2.00.

36 yd. muslin at $12\frac{1}{2}$ c.

Jan. 17, 1911, Frank Brown buys of C. E. Wood, on account,

2 pr. gloves at \$1.65.

10 yd. ribbon at 19c.

1 pr. shoes at \$3.25.

Mar. 13, 1911, Frank Brown buys of C. E. Wood, on account,

20 yd. flannel at 45c.

8 doz. buttons at 12c.

Apr. 15, 1911, Frank Brown pays C. E. Wood, on account,

Cash \$25.00.

May 20, 1911, Frank Brown pays C. E. Wood cash to balance account.

Make out and render itemized bill, Jan. 31, 1911.

Render a statement, Feb. 28, 1911.

Make out the account to be rendered, Mar. 31, 1911.

Render a statement, April 29, 1911.

Receipt the last statement in full, May 20, 1911.

Chicago, Ill., March 31, 1911.

Mr. Frank Brown.

To C. E. Wood, Dr.

1911		To account rendered Feb. 28, 1911			38 00
Mar.	13	20 yd. flannel @ .45	9 00		
		8 doz. buttons @ .12	96		9 96
					47 96

Chicago, Ill., April 29, 1911

Mr. Frank Brown.

To C. E. Wood, Dr.

1911		To account rendered March 31, 1911			47 96
		Cr.			
April	15	By cash	25 00		25 00
		Balance			22 96

Chicago, Ill., May 20, 1911.

Mr. Frank Brown.

To C. E. Wood, Dr.

		To balance on account.			22 96
		Received payment in full.			
		C. E. WOOD.			

Chicago, Ill., January 31, 1911.

Mr. Frank Brown.

To C. E. Brown, Dr.

1911					
Jan.	10	20 yd. silk	@ \$1.25	25 00	
		3 yd. lining	@ .25	75	
		$\frac{3}{4}$ yd. lace	@ 2.40	1 80	
		1 doz. men's linen hdkfs.	@ 2.00	2 00	29 55
	17	2 pr. gloves	@ 1.65	3 30	
		10 yd. ribbon	@ .19	1 90	
		1 pr. shoes	@ 3.25	3 25	8 45
					38 00

STATEMENT.

Chicago, Ill., Feb. 28, 1911.

Mr. Frank Brown.

To C. E. Wood, Dr.

		To account rendered Jan. 31, 1911			38 00
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EXERCISE 17.

Make out bills for the following sales, inserting date, name, and address of purchaser and dealer when wanting:

1. Charles Adams buys of Hall and Lane 75 lb. sugar at $4\frac{1}{2}c$; 32 lb. coffee at $28c$; 12 bbl. flour at $\$6.75$; 56 lb. lard at $13\frac{1}{2}c$.
2. April 4, 1911, James Burgess sells 2 cows at $\$50$; 1 horse at $\$150$; 1 wagon at $\$58.50$; 1 sleigh at $\$75$; 2 harnesses at $\$37.50$.
3. Sell to your neighbor the following goods: 10 lb. sugar at $4\frac{1}{2}c$; 3 doz. eggs at $28c$; 5 lb. coffee at $34c$; 3 lb. tea at $48c$; $4\frac{1}{2}$ lb. butter at $32c$; $1\frac{1}{2}$ lb. cheese at $24c$.
4. Mr. Edward Saunders buys of R. S. Holmes & Co. 6 pairs men's shoes at $\$3.75$; 8 pairs slippers at $\$1.25$; 8 pairs women's shoes at $\$3.20$; 5 pairs boys' shoes at $\$1.37\frac{1}{2}$.
5. Louis P. Whipple & Co. sell to Mrs. Ernest Miller 18 rolls of wall paper at $12\frac{1}{2}c$; 44 yards of border at $7\frac{3}{4}c$; 122 feet of molding at $7\frac{1}{2}c$.
6. Bill for dry goods: 12 yd. crash at $15c$; 1 doz. napkins at $\$2.50$; 2 table-cloths at $\$2.75$; 45 yd. sheeting at $12\frac{1}{2}c$; 10 pillow slips at $20c$.
7. Chandler and Sears bought of R. H. Mitchell & Co. $5\frac{1}{2}$ doz. cups and saucers at $\$5.50$; 12 doz. tumblers at $\$1.10$; 5 doz. plates at $\$4.25$; $2\frac{1}{2}$ doz. bowls at $\$1.10$; 6 doz. mugs at $70c$.
8. March 1, 1911, you buy of John Morrill 8 collars at $\$1.50$ per dozen; 6 pairs cuffs at $\$3.00$ per dozen; 4 shirts at $\$1.25$; 3 neckties at $50c$. John Morrill presents his bill April 1, 1911.

FACTORS AND MULTIPLES.

FACTORING.

When we divide a number into two numbers which, multiplied together, give a product equal to the given number, we have found the *factors* of that number.

Finding the factors of a number is called *factoring*.

Name two factors of 16, 20, 28, 33, 35, 48, 56, 64, 72.

Name three factors of 12. $12=4\times 3=2\times 2\times 3$.

The three factors of 12 are 2, 2, and 3.

What three factors produce 18, 28, 30, 36, 40?

A *composite number* is a number that has other factors besides itself and 1; as 10, 16, 28, etc.

A *prime number* is a number that has no other factors than itself and 1; as 1, 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, etc.

A *prime factor* is a prime number that is a factor.

4	and	9	are factors of	36
3	and	12	“ “ “	36
2	and	18	“ “ “	36
6	and	6	“ “ “	36

but the prime factors of 36 are 2, 2, 3, and 3.

From this illustration we see that a number may have two or more sets of factors, but there can be only one set of prime factors.

A simple method of *finding* the *prime factors* of a number is the following:

2) 36 Divide the given number by the smallest prime number that
 2) 18 is contained in it without remainder; divide the quotient by the
 3) 9 smallest prime number that is contained in it without a remain-
 3 der; and so on until the quotient itself is a prime number.

The several divisors and the last quotient are the prime factors.

A number is divisible by

2 if the units' figure is 2, 4, 6, 8, 0.

3 if the sum of the digits is divisible by 3.

5 if the units' figure is 5 or 0.

9 if the sum of the digits is divisible by 9.

Which of the following numbers are divisible by 2? by 3? by 5? by 9?

24	836	516	378	1440	3060
35	225	728	800	1250	3573
63	633	189	297	6744	1620

Find the prime factors of

1. 38: 48: 49: 56: 60: 63: 68: 75: 88: 95
2. 42: 51: 54: 160: 168: 210: 112: 176: 220: 111
3. 252: 234: 225: 208: 329: 357: 208: 192: 476: 102

The factor 2 is found in 8, also in 12, therefore 2 is a common factor of 8 and 12.

The greatest factor common to both 8 and 12 is 4, therefore 4 is the greatest common factor of 8 and 12.

Find the greatest common factor of 24 and 36.

$$24 = 2 \times 2 \times 2 \times 3$$

$$36 = 2 \times 2 \times 3 \times 3$$

The common prime factors are 2, 2, and 3, whose product is 12. Thus 12 is the greatest common factor of 24 and 36.

A convenient way of *finding* the *greatest common factor* is as follows:

$\begin{array}{r} 2) 24 \overline{) 36} \\ 2) 12 \overline{) 18} \\ 3) 6 \overline{) 9} \\ 2 \overline{) 3} \end{array}$	Arrange the numbers and divide by the smallest prime factor. In the illustration, the smallest prime factor is 2, and the quotients are 12 and 18. Repeat the process, dividing by 2. The quotients are 6 and 9. Divide these quotients by 3, the smallest common prime factor. The quotients, 2 and 3, have no common factor.
--	---

The *greatest common factor* (G. C. F.) of two or more numbers is the product of their common prime factors. In this example the G. C. F. is the product of 2, 2, and 3, which is 12.

EXERCISE 18.

Find the G. C. F. of

- | | |
|---------------|--------------------|
| 1. 24 and 48 | 6. 36, 40, 48, 72 |
| 2. 36 and 40 | 7. 16, 20, 24, 40 |
| 3. 64 and 72 | 8. 15, 35, 75, 90 |
| 4. 75 and 90 | 9. 18, 36, 72, 90 |
| 5. 48 and 128 | 10. 14, 28, 42, 84 |

The greatest common factor is often called the greatest common divisor, or the greatest common measure. Finding the G. C. F. of large numbers is of little importance.

CANCELLATION.

Cancelling or *striking out* common factors from both divisor and dividend does not change the quotient, but it shortens the work in division.

Multiply 240 by 24 and divide the product by 20.

Regular Way

$$\begin{array}{r} 240 \\ 24 \\ \hline 960 \\ 480 \\ \hline \end{array}$$

$$\begin{array}{r} 20 \overline{) 5760} \\ 288 \end{array}$$

Short Way

$$\begin{array}{r} 12 \\ 240 \times 24 \\ \hline 20 \overline{) 288} \end{array}$$

Cancellation is a method of work that should be employed on every possible occasion.

EXERCISE 19.

Cancellation:

- | | |
|---|--|
| 1. $6 \times 21 \times 5 \div 7 \times 2$ | 6. $7 \times 8 \times 44 \div 7 \times 11 \times 16$ |
| 2. $40 \times 24 \times 3 \div 10 \times 12$ | 7. $18 \times 30 \times 48 \div 24 \times 30 \times 36$ |
| 3. $5 \times 66 \times 8 \div 4 \times 11$ | 8. $32 \times 50 \times 72 \div 12 \times 64 \times 70$ |
| 4. $12 \times 6 \times 25 \div 5 \times 18 \times 10$ | 9. $14 \times 25 \times 36 \div 12 \times 5 \times 7$ |
| 5. $6 \times 24 \times 54 \div 9 \times 12$ | 10. $28 \times 70 \times 98 \div 20 \times 14 \times 49$ |

11. Mr. Smith walks 17 miles in 5 hours. At the same rate how many miles will he walk in 20 hours? in 25 hours? in 40 hours?

12. My lot of land is $\frac{2}{7}$ as large as my neighbor's lot, which contains 17,500 square feet. How many square feet are there in my lot?

13. Mr. A. is worth $\frac{3}{8}$ as much as Mr. B. If Mr. A. is worth \$6000, how much is Mr. B. worth?

LEAST COMMON MULTIPLE.

A *multiple* of a number is a number that is exactly divisible by it.
 $3 \times 5 = 15$. 15 is a multiple of both 3 and 5.

A multiple of a number is larger than the number, except when it is the number itself.

Multiples of 8 are 8, 16, 24, 32, 40, 48, 56, 64, 72, etc.

Multiples of 12 are 12, 24, 36, 48, 60, 72, etc.

We notice in the above multiples of 8 and 12, that 24, 48, and 72 are common to both. 24 is the smallest common multiple, and we call it the *least common multiple*.

The *least common multiple* (L. C. M.) of two or more numbers is the least number that is a multiple of each of them.

The *least common multiple* of two or more numbers is the *product* of their *prime factors*, each factor being used the greatest number of times it is found in any of the numbers.

Find the L. C. M. of 8, 12, and 20.

$8 = 2 \times 2 \times 2$ The greatest number of times 2 is used as a factor in
 $12 = 2 \times 2 \times 3$ any number is 3 times.

$20 = 2 \times 2 \times 5$ The greatest number of times 3 is used is once.

The greatest number of times 5 is used is once.

The L. C. M. of 8, 12, and 20 is $2 \times 2 \times 2 \times 3 \times 5 = 120$.

Another method of *finding* the L. C. M. is to divide by any prime number that will divide one or more of the numbers.

$$\begin{array}{r} 2 \overline{) 8-12-20} \\ 2 \overline{) 4-6-10} \\ 2 \overline{) 2-3-5} \\ 3 \overline{) 1-3-5} \\ 5 \overline{) 1-1-5} \\ 1-1-1 \end{array}$$
 When one or more of the numbers are not divisible, bring them down without changing them.

Continue to divide until all the quotients are 1.

The product of all the divisors will be the L. C. M.
 $2 \times 2 \times 2 \times 3 \times 5 = 120$ L. C. M.

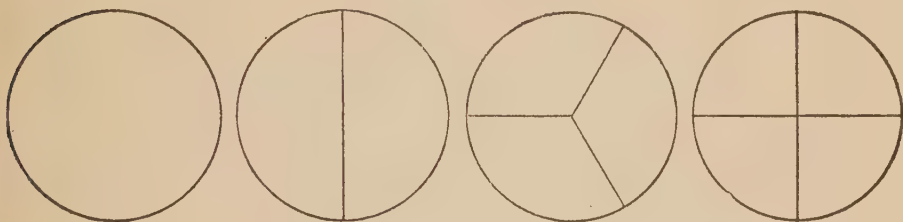
EXERCISE 20.

Find the L. C. M. of

- | | |
|----------------|---------------------|
| 1. 30, 45, 64 | 11. 22, 44, 88, 108 |
| 2. 36, 45, 60 | 12. 27, 32, 36, 56 |
| 3. 27, 33, 54 | 13. 28, 56, 72, 96 |
| 4. 12, 18, 96 | 14. 14, 42, 63, 108 |
| 5. 20, 27, 45 | 15. 21, 63, 72, 99 |
| 6. 14, 96, 128 | 16. 72, 80, 84, 96 |
| 7. 15, 26, 39 | 17. 42, 48, 84, 126 |
| 8. 25, 60, 180 | 18. 18, 20, 36, 72 |
| 9. 16, 42, 80 | 19. 32, 36, 49, 56 |
| 10. 42, 56, 70 | 20. 28, 72, 84, 96 |

The least common multiple of large numbers is of little importance, and is confusing to a child at this stage of mathematics.

FRACTIONS.



The first circle represents a unit.

The second circle is divided into two equal parts: each part is called one half ($\frac{1}{2}$).

The third circle is divided into three equal parts: each part is called one third ($\frac{1}{3}$); two parts are called two thirds ($\frac{2}{3}$).

The fourth circle is divided in four equal parts: each part is called one fourth ($\frac{1}{4}$); two parts are called two fourths ($\frac{2}{4}$); $\frac{2}{4}$ are the same as $\frac{1}{2}$; three parts are called three fourths ($\frac{3}{4}$).

Continue the work through fifths, sixths, sevenths, eighths, ninths, tenths, and twelfths.

In expressing a fraction, as $\frac{3}{4}$, the number below the line is called the *denominator*; the number above the line is called the *numerator*.

The *denominator* tells into how many parts the unit is divided, or the size of the parts.

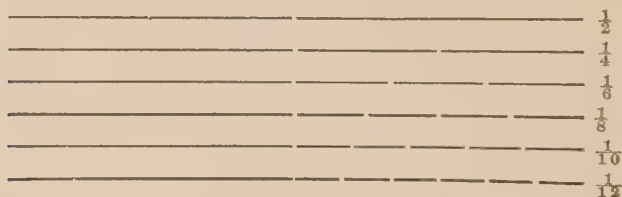
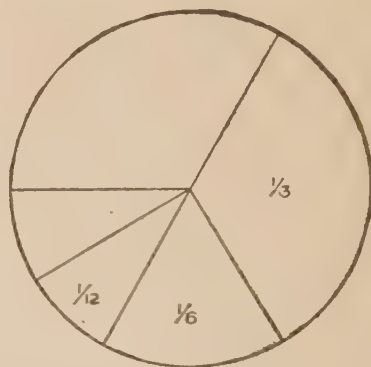
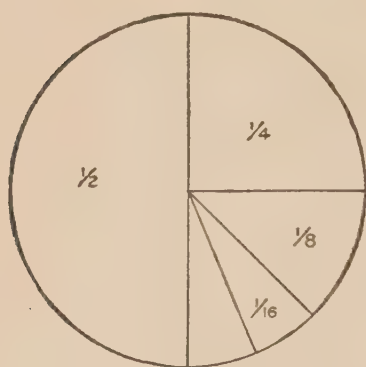
The *numerator* tells how many parts are used.

The numerator and denominator are called the *terms of a fraction*.

A fraction whose numerator is less than its denominator is called a *proper fraction*. As $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{11}{12}$.

A fraction whose numerator is greater than its denominator is called an *improper fraction*, or better, a *fractional number*. As $3\frac{1}{2}$, $7\frac{1}{5}$, $12\frac{1}{11}$.

A *mixed number* is a number consisting of an integer and a fraction. As $3\frac{1}{2}$, $7\frac{1}{8}$.



1 equals how many 4ths, 8ths, 12ths, 16ths?

$\frac{1}{2}$ equals how many 4ths, 8ths, 10ths?

$\frac{1}{4}$ equals how many 8ths, 12ths, 16ths?

Change $\frac{3}{4}$ to 8ths.

$$\frac{1}{4} = \frac{2}{8} \quad \frac{3}{4} = \frac{6}{8}$$

Change $\frac{2}{3}$ to 12ths

$$\frac{1}{3} = \frac{4}{12}$$

$$\frac{2}{3} = \frac{8}{12}$$

Change $\frac{3}{4}$ to 24ths

$$\frac{3}{4} \times \frac{6}{6} = \frac{18}{24}$$

To *change a given fraction to an equivalent fraction in larger terms*, multiply both terms of the fraction by the number which will change the denominator of the given fraction to the denominator of the required fraction.

The multiplier is found by dividing the required denominator by the given denominator.

Change

$\frac{1}{3}$ to 12ths

$\frac{7}{8}$ to 32nds

$\frac{2}{3}$ to 60ths

$\frac{5}{6}$ to 24ths

$\frac{5}{12}$ to 48ths

$\frac{9}{10}$ to 50ths

$\frac{3}{8}$ to 25ths

$\frac{5}{6}$ to 36ths

$\frac{4}{15}$ to 39ths

How many 18ths in $\frac{2}{3}$, $\frac{4}{9}$, $\frac{5}{6}$, 3, $2\frac{1}{2}$, $1\frac{2}{3}$?

How many 12ths in $\frac{1}{6}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, 4, 8, $2\frac{1}{3}$?

Have the child fill in the missing numerators, and prove the first four of each example by a drawing.

1. $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8} = 10 = 12$
2. $\frac{1}{4} = \frac{2}{8} = 12 = 16 = 32 = 64$
3. $\frac{3}{5} = 10 = 15 = 20 = 25 = 30$
4. $\frac{2}{3} = 6 = 9 = 12 = 15 = 18$
5. $\frac{5}{8} = 16 = 24 = 32 = 40 = 48$

The *least common denominator* of two or more fractions is the L. C. M. of their denominators.

Change to equivalent fractions having a least common denominator.

$$\frac{1}{2}, \frac{3}{4}, \frac{2}{3}$$

$$\frac{2}{3}, \frac{5}{8}, \frac{7}{12}$$

$$\frac{3}{8}, \frac{5}{6}, \frac{2}{9}, \frac{7}{12}$$

$$\frac{1}{4}, \frac{2}{5}, \frac{3}{10}$$

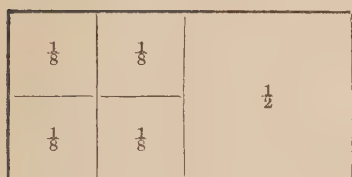
$$\frac{2}{3}, \frac{4}{5}, \frac{1}{6}$$

$$\frac{4}{9}, \frac{7}{12}, \frac{3}{5}$$

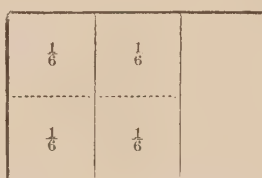
$$\frac{7}{8}, \frac{1}{5}, \frac{1}{2}$$

$$\frac{14}{15}, \frac{11}{20}, \frac{7}{9}, \frac{1}{5}$$

$$\frac{7}{8}, \frac{4}{18}, \frac{3}{4}, \frac{2}{3}$$



$$\frac{4}{8} = \frac{1}{2}$$



$$\frac{4}{3} = \frac{2}{3}$$

To change a given fraction to an equivalent fraction in smaller terms, divide both terms of the fraction by the greatest common factor.

$$\frac{4}{8} \div 4 = \frac{1}{2}$$

$$\frac{4}{6} \div 2 = \frac{2}{3}$$

Reduce to lowest terms:

$$\frac{6}{9}, \frac{4}{12}, \frac{25}{35}, \frac{9}{36}, \frac{10}{16}, \frac{12}{24}, \frac{8}{20}, \frac{25}{50}, \frac{18}{36}, \frac{42}{56}, \frac{32}{128}$$

To be memorized. To multiply or divide both terms of a fraction by the same number does not change its value. Multiply when changing to higher terms; divide when changing to lower terms.

To change a mixed number to an equivalent fractional number.

$2\frac{5}{6}$ is a mixed number. First change the integer 2 to 6ths, making 12 6ths; to this add the 5 6ths, making $\frac{17}{6}$.

Change to equivalent fractional numbers:

$$\begin{array}{ccccc} 4\frac{3}{4} & 16\frac{3}{4} & 15\frac{4}{5} & 92\frac{3}{8} & 36\frac{3}{8} \\ 12\frac{2}{3} & 25\frac{2}{3} & 16\frac{7}{25} & 18\frac{2}{5} & 55\frac{5}{7} \end{array}$$

To change a fractional number to an integral or mixed number, divide the numerator by the denominator.

Change to integral or mixed numbers:

$$\frac{13}{6}, \frac{17}{8}, \frac{35}{7}, \frac{84}{9}, \frac{84}{12}, \frac{61}{5}, \frac{97}{11}, \frac{125}{6}$$

ADDITION OF FRACTIONS.

Add fractions having the same denominator by adding the numerators and placing the sum over the common denominator. Reduce the answer to its simplest form.

$$\frac{2}{7} + \frac{4}{7} = \frac{6}{7} \qquad \frac{1}{8} + \frac{2}{8} + \frac{4}{8} = \frac{7}{8} = 1\frac{7}{8}$$

Fractions having the same denominator are called *similar fractions*.

Fractions must be made *similar* before they can be *added* or *subtracted*.

Add $\frac{1}{2}$ and $\frac{2}{3}$



To add these fractions we must make them similar by reducing them to fractions having the same denominator.

The least common denominator of 2 and 3 is 6.

$$\frac{1}{2} = \frac{3}{6}$$

$$\frac{2}{3} = \frac{4}{6} \quad \text{Thus } \frac{1}{2} + \frac{2}{3} = \frac{3}{6} + \frac{4}{6} = \frac{7}{6} = 1\frac{1}{6}$$

$$\begin{array}{r} 9\frac{1}{4} \\ 25\frac{2}{3} \\ 205\frac{1}{2} \\ \hline 241\frac{7}{4} \end{array}$$

Add $9\frac{1}{4}$, $25\frac{2}{3}$ and $205\frac{1}{2}$. To add mixed numbers, add to the sum of the integers the sum of the fractions, and reduce to lowest terms.

First change the fractions to similar fractions having the L. C. D. 24. Adding 18, 21 and 16 24ths we have $\frac{55}{24} = 2\frac{7}{24}$. Place $\frac{7}{24}$ under the fraction column and add 2 to the units.

EXERCISE 21.

1.

$$\begin{array}{l} \frac{3}{8} + \frac{2}{8} + \frac{1}{2} + \frac{5}{8} = \\ \frac{3}{4} + \frac{1}{4} + \frac{7}{12} + \frac{1}{2} = \\ \frac{5}{8} + \frac{7}{12} + \frac{1}{2} + \frac{2}{3} = \\ \frac{1}{2} + \frac{1}{8} + \frac{5}{8} + \frac{5}{24} = \end{array}$$

$$+ \quad + \quad + \quad =$$

3.

$$\begin{array}{l} \frac{1}{2} + \frac{7}{10} + \frac{2}{5} + \frac{1}{8} = \\ \frac{3}{8} + \frac{1}{5} + \frac{11}{15} + \frac{5}{8} = \\ \frac{17}{10} + \frac{1}{3} + \frac{1}{2} + \frac{4}{15} = \\ \frac{1}{10} + \frac{2}{15} + \frac{1}{6} + \frac{2}{3} = \end{array}$$

$$+ \quad + \quad + \quad =$$

5.

$$\begin{array}{l} \frac{1}{6} + \frac{5}{8} + \frac{3}{10} + \frac{1}{4} = \\ \frac{3}{4} + \frac{1}{2} + \frac{13}{20} + \frac{3}{5} = \\ \frac{7}{10} + \frac{3}{4} + \frac{2}{5} + \frac{1}{10} = \\ \frac{1}{4} + \frac{3}{8} + \frac{7}{10} + \frac{13}{40} = \end{array}$$

$$+ \quad + \quad + \quad =$$

2.

$$\begin{array}{l} \frac{2}{7} + \frac{1}{4} + \frac{3}{14} + \frac{1}{2} = \\ \frac{3}{4} + \frac{1}{3} + \frac{2}{7} + \frac{5}{28} = \\ \frac{1}{2} + \frac{1}{7} + \frac{5}{14} + \frac{3}{7} = \\ \frac{5}{7} + \frac{1}{14} + \frac{11}{28} + \frac{1}{7} = \end{array}$$

$$+ \quad + \quad + \quad =$$

4.

$$\begin{array}{l} \frac{3}{4} + \frac{5}{6} + \frac{1}{18} + \frac{1}{2} = \\ \frac{11}{18} + \frac{1}{9} + \frac{2}{3} + \frac{1}{4} = \\ \frac{5}{9} + \frac{7}{18} + \frac{1}{6} + \frac{5}{12} = \\ \frac{1}{3} + \frac{7}{9} + \frac{3}{4} + \frac{5}{6} = \end{array}$$

$$+ \quad + \quad + \quad =$$

6.

$$\begin{array}{l} \frac{1}{3} + \frac{2}{5} + \frac{3}{10} + \frac{17}{15} = \\ \frac{5}{6} + \frac{1}{2} + \frac{2}{15} + \frac{2}{3} = \\ \frac{1}{2} + \frac{7}{10} + \frac{3}{5} + \frac{1}{10} = \\ \frac{1}{10} + \frac{1}{6} + \frac{2}{3} + \frac{4}{15} = \end{array}$$

$$+ \quad + \quad + \quad =$$

SUBTRACTION OF FRACTIONS.

$$\begin{array}{r} \text{From } \frac{2}{3} \text{ take } \frac{1}{2} \\ \frac{2}{3} = \frac{4}{6} \\ \frac{1}{2} = \frac{3}{6} \\ \frac{2}{3} - \frac{1}{2} = \frac{4}{6} - \frac{3}{6} = \frac{1}{6} \end{array}$$

$$\begin{array}{r} \text{From } 25\frac{1}{8} \text{ take } 9\frac{3}{8} \\ 25\cancel{7}\frac{1}{8} \\ \underline{9\cancel{4}\frac{6}{8}} \\ 16\frac{1}{8} \end{array}$$

$$\begin{array}{r} \text{From } 25\frac{3}{8} \text{ take } 9\frac{1}{8} \\ 25\cancel{7}\frac{6}{8} \\ \underline{9\cancel{4}\frac{4}{8}} \\ 15\frac{1}{2} \end{array}$$

Rule for subtraction of fractions. Change both fractions to similar fractions and find the difference of the numerators. Write the result over the common denominator and reduce to simplest form.

To subtract one mixed number from another, change the fractions to similar fractions and subtract.

As we cannot take $\frac{7}{8}$ from $\frac{6}{8}$, we change 1 unit of the 25 to 8ths, which with $\frac{6}{8} = \frac{14}{8}$
 $\frac{14}{8} - \frac{7}{8} = \frac{7}{8}$ $24 - 9 = 15$.

Subtraction examples:

$$\begin{array}{r} \frac{1}{2} - \frac{1}{4} \\ \frac{1}{4} - \frac{1}{7} \\ \frac{1}{6} - \frac{1}{9} \\ \frac{11}{12} - \frac{3}{4} \\ \frac{17}{24} - \frac{11}{30} \end{array}$$

$$\begin{array}{r} \frac{7}{10} - \frac{2}{5} \\ \frac{5}{6} - \frac{3}{4} \\ \frac{1}{2} - \frac{4}{9} \\ \frac{7}{9} - \frac{3}{4} \\ 56\frac{2}{15} - 32\frac{1}{5} \end{array}$$

$$\begin{array}{r} 15\frac{1}{2} - 12\frac{1}{5} \\ 15\frac{2}{6} - 7\frac{3}{6} \\ 29\frac{1}{3} - 25\frac{7}{8} \\ 54\frac{2}{3} - 22\frac{5}{6} \\ 72 - 48\frac{3}{8} \end{array}$$

MULTIPLICATION OF FRACTIONS.

Review. The numerator of a fraction shows the number of parts. The denominator shows the size of each part.

To multiply $\frac{3}{4}$ by 2 we may multiply the number of parts $2 \times \frac{3}{4} = \frac{6}{4} = \frac{3}{2}$, or make each part twice as large by dividing the denominator.

$$2 \times \frac{3}{4} = \frac{3}{2}$$

A fraction is multiplied by multiplying the numerator, or by dividing the denominator.

Multiply $\frac{7}{8}$ by 4.

Every whole number, or integer, may be considered the numerator of a fraction whose denominator is 1. Therefore 4 may be written $\frac{4}{1}$.

$$\frac{7}{8} \times 4 = \frac{7\cancel{4}}{\cancel{2}} = \frac{7}{2} = 3\frac{1}{2}. \text{ Cancel when possible.}$$

Multiply, cancelling when possible:

$\frac{3}{7} \times 4$	$27 \times \frac{2}{3}$	$\frac{4}{16} \times 5$	$11 \times 1\frac{2}{3}$
$\frac{4}{5} \times 2$	$36 \times \frac{13}{42}$	$\frac{3}{8} \times 6$	$8 \times \frac{9}{24}$
$\frac{3}{10} \times 5$	$124 \times \frac{3}{8}$	$1\frac{1}{2} \times 10$	$12 \times \frac{21}{60}$
$\frac{5}{13} \times 4$	$54 \times \frac{5}{12}$	$\frac{34}{63} \times 21$	$36 \times 1\frac{1}{2}$
$\frac{17}{18} \times 6$	$45 \times \frac{8}{15}$	$\frac{45}{77} \times 22$	$16 \times \frac{15}{4}$
$\frac{3}{14} \times 7$	$16 \times \frac{3}{4}$	$1\frac{7}{14} \times 12$	$120 \times \frac{10}{80}$

To multiply one fraction by another fraction.



$$\frac{1}{2} \text{ of } \frac{1}{4} = \frac{1}{8} \text{ or } \frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$$



$$\frac{1}{2} \text{ of } \frac{3}{4} = \frac{3}{8} \text{ or } \frac{1}{2} \times \frac{3}{4} = \frac{3}{8}$$

To multiply one fraction by another fraction, multiply the numerators together for the numerator of the product, and multiply the denominators together for the denominator of the product, and reduce to simplest form.

Multiply, cancelling when possible:

$$\begin{array}{llll} \frac{13}{4} \times \frac{7}{11} & \frac{4}{5} \times \frac{5}{12} & \frac{8}{12} \times \frac{9}{16} & \frac{10}{11} \times \frac{3}{10} \\ \frac{42}{75} \times \frac{5}{21} & \frac{5}{9} \times \frac{7}{15} & \frac{11}{15} \times \frac{5}{7} & \frac{7}{9} \times \frac{16}{14} \\ \frac{9}{24} \times \frac{10}{14} & \frac{14}{11} \times \frac{7}{10} & \frac{5}{9} \times \frac{6}{35} & \frac{15}{16} \times \frac{8}{10} \end{array}$$

To multiply a mixed number by a mixed number.

$$\text{Multiply } 3\frac{3}{8} \text{ by } 6\frac{5}{8} = \frac{27}{8} \times \frac{54}{8} = \frac{45}{2} = 22\frac{1}{2}.$$

To multiply a mixed number by a mixed number, change the mixed numbers to equivalent fractional numbers, and multiply as fractions.

Multiply the following mixed numbers:

$$\begin{array}{lll} 3\frac{1}{3} \times 4\frac{4}{5} & 45\frac{1}{3} \times 28\frac{1}{2} & 6\frac{5}{8} \times 9\frac{1}{7} \\ 2\frac{4}{5} \times 3\frac{4}{7} & 82\frac{1}{4} \times 18\frac{3}{8} & 81\frac{1}{5} \times 23\frac{3}{7} \\ 35\frac{2}{5} \times 3\frac{3}{8} & 15\frac{5}{8} \times 15\frac{3}{8} & 17\frac{3}{4} \times 14\frac{2}{5} \end{array}$$

To multiply an integer by a mixed number.

Multiply 125 by $4\frac{2}{5}$.

$$\begin{array}{r} 125 \\ 4\frac{2}{5} \\ 5 \overline{)250} \\ \underline{50} \\ 500 \\ \underline{550} \end{array}$$

To multiply an integer by a mixed number, multiply the integer by the fractional part of the mixed number, and then by the whole part.

Multiply 128 by $4\frac{2}{5}$.

$\frac{128 \times 22}{5} = \frac{2816}{5} = 563\frac{1}{5}$. When the integer cannot be divided evenly by the denominator of the fractional part of the mixed number, change the mixed number to a fractional number and multiply. Multiply, using the method best adapted to the example.

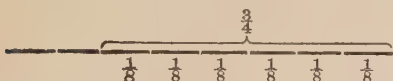
$$\begin{array}{lll} 164 \times 17\frac{1}{2} & 152 \times 24\frac{3}{4} & 504 \times 87\frac{1}{2} \\ 225 \times 2\frac{3}{8} & 225 \times 16\frac{3}{4} & 72 \times 52\frac{1}{8} \\ 136 \times 5\frac{1}{4} & 192 \times 204\frac{3}{8} & 108 \times 67\frac{1}{4} \\ 187 \times 16\frac{3}{11} & 516 \times 54\frac{7}{12} & 725 \times 90\frac{2}{5} \end{array}$$

DIVISION OF FRACTIONS.

1. To divide a fraction by an integer. In multiplications of fractions we learned that a fraction was multiplied by multiplying the numerator or dividing the denominator. In division of fractions the reverse is true. A fraction is divided by dividing the numerator or multiplying the denominator.



Divide $\frac{3}{4}$ by 3
 $\frac{3}{4} \div 3 = \frac{1}{4}$



Divide $\frac{3}{4}$ by 2
 $\frac{3}{4} \div 2 = \frac{3}{8}$

Divide the following, using the method best adapted to the example:

$$\frac{4}{5} \div 4$$

$$\frac{16}{25} \div 8$$

$$3\frac{1}{4} \div 8$$

$$4\frac{3}{5} \div 12$$

$$\frac{7}{8} \div 2$$

$$\frac{3}{4} \div 7$$

$$\frac{35}{62} \div 7$$

$$6\frac{3}{4} \div 10$$

$$\frac{3}{7} \div 5$$

$$\frac{3}{4} \div 4$$

$$20\frac{5}{7} \div 5$$

$$37\frac{1}{2} \div 15$$

2. To divide an integer or a fraction by a fraction: Divide 4 by $\frac{2}{3}$. We may think of $\frac{2}{3}$ as $\frac{1}{3}$ of 2. Divide 4 by $\frac{1}{3}$ of 2. 4 divided by 2 is the same as finding $\frac{1}{2}$ of 4, but as we were to divide by only $\frac{1}{3}$ of 2, our result is only $\frac{1}{3}$ of what it should be, so we multiply by 3.

Thus we see that $4 \div \frac{2}{3}$ is the same as $4 \times \frac{3}{2} = 6$.

We have inverted our divisor and multiplied. This is the method to be used, invert the divisor and proceed as in multiplication.

Examples in division:

$$\frac{6}{7} \div \frac{3}{5}$$

$$5\frac{5}{7} \div \frac{5}{8}$$

$$\frac{3}{8} \div 5\frac{1}{2}$$

$$24\frac{3}{4} \div 1\frac{1}{2}$$

$$\frac{1}{4} \div \frac{3}{4}$$

$$\frac{3}{8} \div 5\frac{1}{4}$$

$$7\frac{3}{8} \div \frac{5}{8}$$

$$7\frac{7}{8} \div 4\frac{1}{2}$$

$$\frac{5}{6} \div \frac{4}{5}$$

$$7\frac{1}{3} \div 1\frac{2}{3}$$

$$\frac{8}{9} \div \frac{3}{4}$$

$$12\frac{1}{2} \div 6\frac{1}{4}$$

$$\frac{3}{4} \div \frac{3}{5}$$

$$40\frac{1}{2} \div \frac{3}{4}$$

$$18\frac{2}{7} \div \frac{3}{5}$$

$$8 \div 3\frac{2}{3}$$

$$\frac{7}{8} \div 1\frac{1}{8}$$

$$1\frac{1}{2} \div 7\frac{1}{4}$$

$$12\frac{3}{8} \div 7\frac{5}{12}$$

$$\frac{9}{16} \div 1\frac{1}{2}$$

(REVIEW) EXERCISE 22.

Find the G. C. F. of:

1. 21, 35, 49

2. 63, 84, 105

3. 48, 60, 96, 108

4. 75, 150, 225, 250

5. 12, 18, 42, 48.

Find the L. C. M. of:

6. 14, 21, 54, 56, 84

7. 3, 15, 12, 42, 60

8. 12, 20, 30, 45

9. 5, 12, 18, 30, 60

10. 24, 36, 52, 48, 72.

Change to lowest terms:

11. $\frac{24}{56}, \frac{37}{48}, \frac{15}{18}, \frac{55}{121}$
 12. $\frac{136}{168}, \frac{86}{252}, \frac{25}{175}, \frac{86}{84}$
 13. $\frac{80}{120}, \frac{45}{180}, \frac{45}{135}, \frac{48}{288}$
 14. $\frac{35}{105}, \frac{64}{72}, \frac{48}{72}, \frac{86}{90}$
 15. $\frac{24}{86}, \frac{180}{234}, \frac{308}{508}, \frac{144}{192}$

Change to other forms:

16. $69\frac{5}{8}, \frac{586}{12}, \frac{4006}{16}$
 17. $57\frac{7}{8}, 607\frac{7}{8}, 48\frac{3}{4}$
 18. $24\frac{5}{12}, 66\frac{2}{3}, \frac{675}{25}$
 19. $362\frac{1}{4}, \frac{286}{16}, \frac{8450}{72}$
 20. $2\frac{36}{8}, \frac{1188}{27}$

Addition:

21. $\frac{3}{7} + \frac{7}{10} + \frac{1}{2} + \frac{2}{5}$
 22. $12\frac{3}{4} + 20\frac{7}{8} + 152\frac{5}{12}$
 23. $205\frac{3}{4} + 56\frac{2}{3} + 99\frac{5}{8}$
 24. $5\frac{3}{4} + 29\frac{5}{8} + 1\frac{5}{4} + 49$
 25. $201\frac{3}{5} + 52\frac{1}{3} + 76\frac{8}{20}$

Subtraction:

26. $78\frac{3}{4} - 27\frac{1}{8}$
 27. $24\frac{2}{3} - 5\frac{5}{8}$
 28. $18\frac{1}{5} - 12\frac{8}{9}$
 29. $28\frac{1}{2} - 12\frac{9}{10}$
 30. $72 - 15\frac{1}{3}$

Multiplication:

31. $11\frac{1}{8} \times \frac{6}{7}$
 32. $\frac{9}{12} \times \frac{6}{7} \times 1\frac{1}{8}$
 33. $\frac{7}{15} \times \frac{4}{27} \times 1\frac{1}{4} \times 3\frac{1}{2} \times 4\frac{2}{7}$
 34. $\frac{9}{10} \times \frac{5}{8} \times \frac{4}{7} \times 15\frac{3}{4}$
 35. $\frac{10}{27} \times \frac{18}{5} \times 3\frac{5}{7} \times 101\frac{1}{8}$

Division:

36. $17\frac{1}{2} \div 2\frac{1}{4}$
 37. $45\frac{5}{8} \div 3\frac{1}{27}$
 38. $\frac{7}{12}$ of $2\frac{5}{8} \div \frac{5}{8}$ of $8\frac{3}{4}$
 39. $7\frac{1}{5} \div \frac{6}{7}$
 40. $13\frac{3}{7} \div 25$

TABLES OF MEASURE.

LENGTH OR DISTANCE.

- 12 inches (in. or ") = 1 foot
 (ft. or ')
 3 feet = 1 yard (yd.)
 5½ yd. or 16½ ft. = 1 rod (rd.)
 320 rods } = 1 statute mile (mi.)
 5280 feet }
 4 inches = 1 hand
 6 feet = 1 fathom
 1.15 common } 1 nautical mile
 miles } = 1 geographical mile
 3 knots = 1 league
 1 league = 3 geographical miles

SURFACE.

- 144 square inches (sq. in.) = 1 square foot (sq. ft.)
 9 square feet = 1 square yard (sq. yd.)
 30¼ square yards or 272¼ square feet = 1 square rod (sq. rd.)
 160 square rods = 1 acre (A.)
 640 acres = 1 square mile (sq. mi.)
 1 square mile = 1 section
 36 square miles = 1 township
 100 square feet = 1 square of flooring, shingles, slating, or roofing.

A *surface* has two dimensions, length and breadth.

A *rectangle* is a plane surface bounded by four straight lines, and having all its angles right angles.

A *square* is a rectangle all of whose sides are equal.

The *area* of a surface is the number of square units it contains.

Find the area of a rectangle 3 feet long and 2 feet wide.

1 sq. ft.	1 sq. ft.	1 sq. ft.
1 sq. ft.	1 sq. ft.	1 sq. ft.

Since there are 3 sq. ft. in 1 row, in 2 rows there will be 2×3 sq. ft. or 6 sq. ft.

Rule for area.

To find the area of a rectangle, multiply the number of square units in one row by the number of rows; or, multiply the units in length by the units in breadth, remembering that the units must be of the same denomination. Inches cannot be multiplied by feet, nor feet by yards.

If the units are different, one must be changed to an equivalent form of the denomination of the other.

EXERCISE 23.

1. A floor measures 18 ft. by 15 ft. How many square feet does it contain? How many square yards?

$$\begin{array}{r}
 18 \\
 \underline{15} \\
 90 \\
 18 \\
 \underline{} \\
 270 \text{ sq. ft.}
 \end{array}
 \qquad
 270 \div 9 = 30 \text{ sq. yd.}$$

2. A floor measures 24 ft. by 18 ft. How many square yards does it contain?

3. How many square rods in a tract of land 120 rd. long and 40 rd. wide? Find its value at \$75 per acre.

4. What is the cost of concreting a walk $25\frac{1}{2}$ ft. long and 5 ft. wide at 70¢ per square yard?

5. How many acres are there in a rectangular field 162 rd. long and 84 rd. wide?

6. How many paving blocks will be needed to pave a street 1750 ft. long and 40 ft. wide, if it takes 48 blocks to pave a square yard?

7. A swimming tank is 38 ft. long and 18 ft. wide. What will it cost to cement the bottom at \$2.35 per square yard?

8. Compare a field 46 rd. long and 38 rd. wide with a 10 acre lot. Which is larger, and how much larger?

VOLUME.

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)

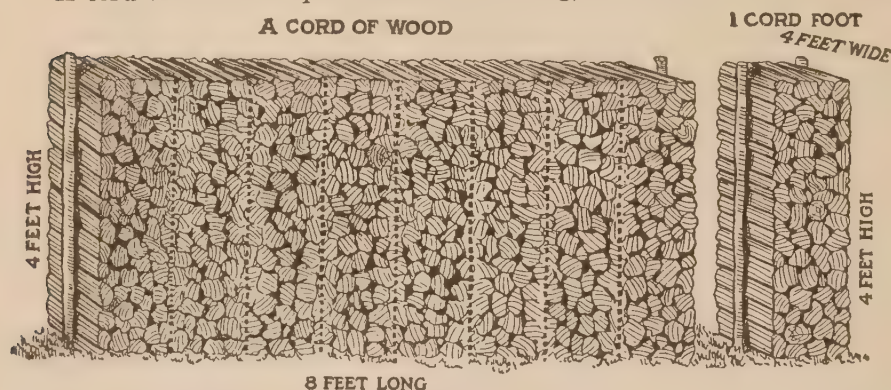
27 cubic feet = 1 cubic yard (cu. yd.)

128 cubic feet = 1 cord (cd.)

16 cubic feet = 1 cord foot (cd. ft.)

8 cord feet = 1 cord (cd.)

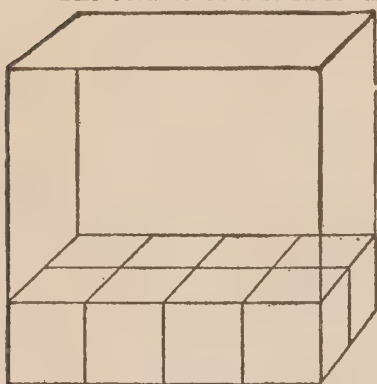
A cord of wood is a pile of wood 8 ft. long, 4 ft. wide, and 4 ft. high.



A *rectangular solid* is a solid bounded by six rectangles. The rectangles are called the *faces* of the solid.

A *cube* is a rectangular solid bounded by six equal faces (squares).

The *volume* of a solid is its contents reckoned in cubic units.



4 cu. ft. in 1 row.

2

8 cu. ft. in the 2 rows (the bottom layer).

Rule for volume.

To find the volume of a rectangular solid, multiply the area of the base by the height.

How many cubic feet are there in a rectangular solid 4 ft. long, 2 ft. wide and 4 ft. high?

Multiply the number of cu. ft. in 1 row by the number of rows, to find the number of cubic feet in 1 layer.

Multiply the number of cu. ft. in 1 layer by the number of layers. This gives the number of cu. ft. in the solid.

8 cu. ft.

4 (number of layers).

32 cu. ft. in the solid.

EXERCISE 24.

1. How many cubic feet of earth will be removed in digging a cellar 18 ft. by 12 ft. by 8 ft.?
2. What will it cost at 65c a cubic yard?
3. The dimensions of a room are 15 ft., 14 ft. and 9 ft. How many square feet of floor? Of walls? Of ceiling? How many cubic feet of volume?

COUNTING.

12 things = 1 dozen (doz.)

12 dozen = 1 gross (gr.)

12 gross = 1 great gross.

20 things = 1 score.

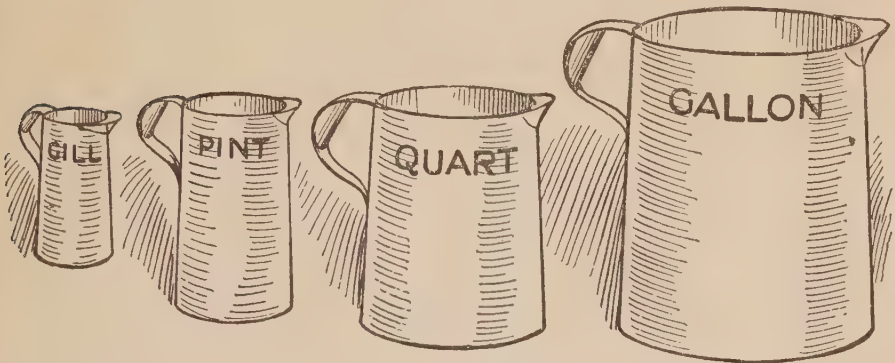
Paper Table.

24 sheets = 1 quire.

20 quires or 480 sheets = 1 ream

2 reams = 1 bundle.

CAPACITY.



Liquid Measure.

4 gills = 1 pint (pt.)

2 pints = 1 quart (qt.)

4 quarts = 1 gallon (gal.)

1 gallon = 231 cubic inches.

Dry Measure.

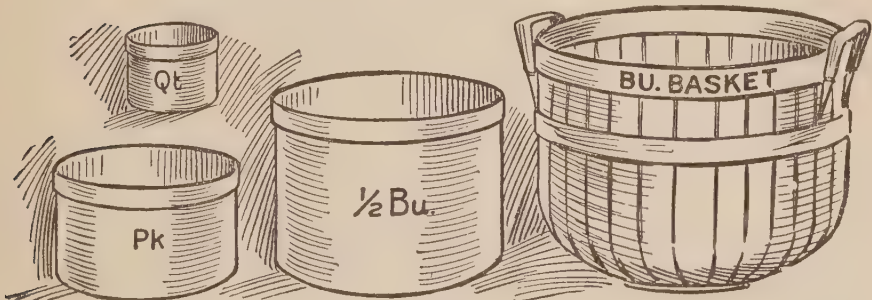
2 pints (pt.) = 1 quart (qt.)

8 quarts = 1 peck (pk.)

4 pecks = 1 bushel (bu.)

10 pecks, 2½ bushels = 1 barrel, (bbl.)

1 bushel = 2150.42 cu. in.



Time.	Weight (Avoirdupois).
60 seconds (sec.) = 1 minute (min.)	16 ounces (oz.) = 1 pound (lb.)
60 minutes = 1 hour (hr.)	100 pounds = 1 hundredweight (cwt.)
24 hours = 1 day (da.)	2000 pounds = 1 ton (T.)
7 days = 1 week (wk.)	2240 pounds = 1 long ton (L. T.)
365 days = 1 common year (yr.)	60 pounds = 1 bushel wheat or po- tatoes.
366 days = 1 leap year.	196 pounds = 1 barrel flour.
12 months (mo.) = 1 year.	200 pounds = 1 barrel pork or beef.
100 years = 1 century	

Circular.

60 seconds (") = 1 minute (')
60 minutes = 1 degree (°)
360 degrees = 1 circumference.

EXERCISE 25.

The following problems will help fix the tables in the mind. In performing a problem imagine yourself to be one of the parties in every transaction.

1. Change 26 quarts to bushels and pecks. Find the number of quarts in 3 bu., 3 pk., 3 qt.
2. Reduce 3 acres to square feet.
3. How many reams of paper are there in 6720 sheets?
4. Change 62,208 cu. in. to cu. yd.
5. A man bought 5 acres of land at \$172 per acre, and sold it at 23c per sq. ft. What was his gain?
6. What must be paid for a pile of wood 25 ft. long, 4 ft. high, and 4 ft. wide, at \$5.75 per cord?
7. Find the entire surface of a block of marble 10 ft. long, $2\frac{1}{2}$ ft. wide, and $1\frac{1}{2}$ ft. thick.
8. What will 5 bu. 3 pk. of potatoes cost at \$1.15 per bushel?
9. How many gallons of water are there in a tank 3 ft. square, if the water is 4 ft. 4 in. deep?
10. A man paid \$385 for 77 cords of wood. He sold the following lots: $12\frac{1}{2}$ cd., 18 cd., and $14\frac{3}{4}$ cd., all at \$5.25 per cd. What did he gain on what he sold?

PRACTICAL APPLICATION OF SURFACE MEASURE.

BOARD MEASURE.

A board foot is the unit of measure for boards, planks, timbers, and joists.

A *board foot* is 1 foot long, 1 foot wide, and 1 inch thick. Lumber less than 1 inch thick is considered 1 inch thick in measuring.

To find the number of feet of lumber or any timber, find the area of one face in square feet and multiply by the thickness in inches.

EXERCISE 26.

Find the board feet in the following:

1. A board 21 ft. long, 8 in. wide, $\frac{7}{8}$ in. thick.
2. A board 18 ft. long, 12 in. wide, 1 in. thick.
3. 8 joists, each 3 in. by $\frac{1}{4}$ in. and 15 ft. long.
4. 5 2-in. planks, each 12 ft. long, 10 in. wide.
5. 8 boards each 15 ft. long, 9 in. wide, $1\frac{1}{2}$ in. thick.

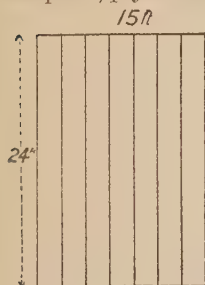
CARPETING.

In determining the number of yards of carpet that must be bought to carpet a floor, divide the width of the room by the width of the carpet, to find the number of breadths.

A fractional part of a breadth should be regarded as a full breadth.

Multiply the length of each breadth by the number of breadths.

What is the cost of carpeting a room 24 ft. long, 15 ft. wide, with carpet $\frac{3}{4}$ yd. wide, at \$1.15 per yard, the breadths to be laid lengthwise?



$$15 \text{ ft.} \div 2\frac{1}{4} \text{ ft.} \div 6\frac{3}{4} = 7 \text{ breadths}$$

$$24 \text{ ft.} \times 7 = 168 \text{ ft.} = 56 \text{ yds.}$$

$$\$1.15 \times 56 = \$64.40.$$

EXERCISE 27.

1. Find the cost of carpeting a floor 24 ft. long and 18 ft. wide, with carpet $\frac{3}{4}$ yard wide, at 95c per yard, breadths to be laid lengthwise.

2. How much will it cost to carpet a room 15 ft. by 12 ft. with carpet $\frac{3}{4}$ yard wide at \$1.20 a yard, if the breadths run lengthwise?

3. A room 24 ft. by 20 ft. is to be carpeted with carpet 1 yd. wide at 85c per yard. Which will be cheaper, to lay the breadths lengthwise or crosswise?

PAPERING.

Wall papers are usually $\frac{1}{2}$ yard wide and 8 yd. long for a single roll, 16 yd. for a double roll.

The usual way of *reckoning* the *number of rolls* required to cover the walls is:

1. Measure the distance around the room.
2. Deduct the width of doors and windows.
3. Divide the difference by the width of the paper to find the number of strips.

4. Divide the length of a roll by the height of the wall to find the number of strips in a roll.

5. Divide the strips required for the room by the strips in a roll. This gives the number of rolls required.

What will it cost to paper the walls of a room 16 ft. long, 15 ft. wide and 9 ft. high at 45c a roll? There are 2 doors $3\frac{1}{2}$ ft. wide and 3 windows 3 ft. wide.

$$2(16 \text{ ft.} + 15 \text{ ft.}) = 62 \text{ ft. distance around the room.}$$

$$7 \text{ ft.} + 9 \text{ ft.} = 16 \text{ ft. width of doors and windows.}$$

$$62 \text{ ft.} - 16 \text{ ft.} = 46 \text{ ft.}$$

$$46 \text{ ft.} \div 1\frac{1}{2} \text{ ft.} (\frac{1}{2} \text{ yd.}) = 30\frac{2}{3} \text{ or } 31 \text{ strips.}$$

16 yd. or 48 ft. $\div$ 9 ft. (height of room) = 5+. We see there can be but 5 strips in a double roll.

$$31 \div 5 = 6\frac{1}{5} \text{ double rolls, which would be equivalent to } 13 \text{ single rolls.}$$

$$13 \times .45 = \$5.85 \text{ cost of paper.}$$

PLASTERING.

To estimate the cost of plastering a room, find the total area of walls and ceiling. Take from this $\frac{1}{2}$ of the surface of doors and windows.

Multiply by the price per sq. yd.

EXERCISE 28.

1. What will be the cost of plastering a room 14 ft. long, 12 ft. wide, 9 ft. high, at 35c per sq. yd.? There are 2 doors 7 ft. by $3\frac{1}{2}$ ft., and 2 windows 6 ft. by 3 ft.

2. Find the cost of plastering a room 24 ft. by 18 ft. by 10 ft., at 30c per sq. yd. There are 2 doors 7 ft. by 3 ft., and 3 windows 6 ft. by $3\frac{1}{2}$ ft.

LATHS AND SHINGLES.

Laths are 4 ft. long, $1\frac{1}{2}$ in. wide, and are usually put up in bundles of 100 each.

Allowing for waste, a bundle of laths will cover 6 sq. yd.

Lathing is estimated by the sq. yd. $\frac{1}{2}$ of the area of all openings is deducted.

Shingles are sold in bunches of 250 each. Dealers will not sell part of a bunch.

Four bunches, or 1,000 shingles, laid 4 inches to the weather, will cover 100 square feet.

EXERCISE 29.

1. How many bundles of laths will be required for the ceiling of a room 18 ft. long and 15 ft. wide?

2. What is the cost of lathing a room 15 ft. long, 12 ft. wide, and 9 ft. high? There are two doors $6\frac{1}{2}$ ft. by $3\frac{1}{2}$ ft., and two windows 6 ft. by $3\frac{1}{2}$ ft.

The laths cost 40c a bundle, and the workman charges 20c a bundle for his labor.

3. How many shingles will be required to shingle the roof of a house 38 ft. long, if the rafters are 22 ft. long?

$$2(38 \times 22) = 1672 \text{ sq. ft.}$$

$$1672 \text{ sq. ft.} \div 100 = 16.72 \text{ squares.}$$

16.72 squares will require $16\frac{3}{4}$ M. or 67 bunches of shingles.

EXERCISE 30.

1. I bought 180 bbl. of flour at \$5.60 per bbl., and sold the whole for \$1,297. How much did I gain?

2. I bought a farm of 135 acres at \$46.50 per acre, and sold the farm for \$8,575. What did I gain or lose?

3. A farmer bought 24 head of young cattle for \$372. He kept them for 4 mo. at an expense of \$2.50 a head per month, and sold them at \$31.50 each. How much did he gain?

4. A merchant bought 750 bu. of potatoes at 48c per bushel. Allowing $2\frac{1}{2}$ bu. for waste, how much will he gain by retailing the rest at 18c a peck?

5. A farmer has 32 apple trees which bear on an average 5 bbl. each. He hires 3 men for a week at \$1.50 per day. He pays 25c each for the barrels, and 10c a barrel for transportation. He sells them for \$3.25 a bbl. How much does he make?

6. A lumber dealer bought 45,500 ft. of lumber at \$22.50 per M. He sold 26,000 ft. at \$31.50 per M., and the remainder at \$27.50 per M. How much did he gain?

In the following time sheet, call 10 hours a day's work.

MANUFACTURER'S TIME SHEET.

	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.	Total Hours	Days	Wages per day	Amount
John Moore ...	10	10	10	10	10	5			\$3.00	\$
Henry Walker	9	9½	9¾	9¾	9½	4½			\$3.00	\$
Benj. Drew ...	8½	9	9½	9¾	9¾	4¼			\$3.00	\$
Fred Norris ...	9½	9¾	10	9	9¾	4½			\$3.00	\$
Frank Prescott	10	10	10	10	10	5			\$3.00	\$
James Bennett	10	10	10	10	10	5			\$3.00	\$
Total....										\$

PERCENTAGE.

Percentage is simply an application of decimal fractions.

Per cent means *hundredths*.

Six per cent means six hundredths, $\frac{6}{100}$ or .06.

The *symbol* or *sign* of per cent is %.

Thus, six per cent is written 6%.

100% of a number is the number itself.

75% of a number is $\frac{75}{100}$ or $\frac{3}{4}$ of the number.

50% of a number is $\frac{50}{100}$ or $\frac{1}{2}$ of the number.

25% of a number is $\frac{25}{100}$ or $\frac{1}{4}$ of the number.

Any per cent of a number may be expressed as a common fraction by writing the per cent as the numerator, and 100 for the denominator. Reduce the fraction to lowest terms.

The following table illustrates the close relationship between percentage and common fractions:

Percent		Decimal		Common Fraction	
100%	=	1.0	=	$\frac{100}{100}$	= 1
75%	=	.75	=	$\frac{75}{100}$	= $\frac{3}{4}$
50%	=	.50	=	$\frac{50}{100}$	= $\frac{1}{2}$
25%	=	.25	=	$\frac{25}{100}$	= $\frac{1}{4}$
10%	=	.10	=	$\frac{10}{100}$	= $\frac{1}{10}$
9%	=	.09	=	$\frac{9}{100}$	
4%	=	.04	=	$\frac{4}{100}$	= $\frac{1}{25}$
1%	=	.01	=	$\frac{1}{100}$	
$\frac{1}{2}\%$	=	.005	=	$\frac{5}{1000}$	= $\frac{1}{200}$
$\frac{1}{4}\%$	=	.0025	=	$\frac{25}{10000}$	= $\frac{1}{400}$
125%	=	1.25	=	$\frac{125}{100}$	= $1\frac{1}{4}$
160%	=	1.60	=	$\frac{160}{100}$	= $1\frac{4}{5}$

Finding $\frac{3}{4}$ of a number is the same as finding 75% of that number.

$180 \div \frac{3}{4}$ of some number; or $180 = 75\%$ of some number. A good knowledge of fractions makes percentage easy. Express as common fractions in lowest terms: 4%, $33\frac{1}{3}\%$, 175%, $\frac{3}{4}\%$.

$$4\% = \frac{4}{100} = \frac{1}{25}, \quad 33\frac{1}{3}\% = \frac{33\frac{1}{3}}{100} = \frac{1}{3}, \quad 175\% = \frac{175}{100} = \frac{7}{4}, \quad \frac{3}{4}\% = \frac{.75}{10000} = \frac{3}{4000}.$$

Express each of the following as a decimal, and as a common fraction in its lowest terms:

20%	75%	125%	60%	9%
25%	15%	$37\frac{1}{2}\%$	$\frac{1}{2}\%$	$61\frac{1}{4}\%$
12%	80%	$87\frac{1}{2}\%$	$137\frac{1}{2}\%$	$11\frac{1}{8}\%$
30%	$16\frac{2}{3}\%$	$\frac{3}{4}\%$	$62\frac{1}{2}\%$	24%

We may express a common fraction as a per cent by reducing the common fraction to a decimal and expressing the decimal as hundredths.

Express as per cents: $\frac{1}{16}$, $\frac{7}{12}$, $1\frac{1}{25}$.

$$\begin{array}{r} .061\frac{1}{4} \\ 16 \overline{)1.00} = 6\frac{1}{4}\% \\ \underline{96} \\ 4 \end{array} \quad \begin{array}{r} .58\frac{1}{3} \\ 12 \overline{)7.00} = 58\frac{1}{3}\% \\ \underline{60} \\ 100 \\ \underline{96} \\ 4 \end{array} \quad \begin{array}{r} .008 \\ 125 \overline{)1.000} = \frac{8}{125}\% \\ \underline{1000} \end{array}$$

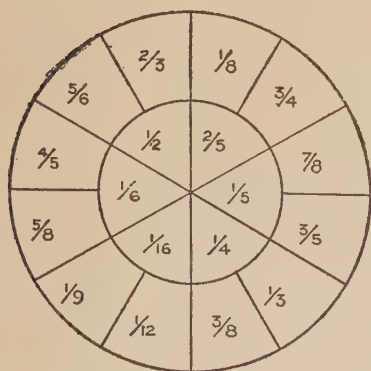
Express decimally as hundredths, and then as per cents:

$$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}, \frac{1}{10}, \frac{1}{12}$$

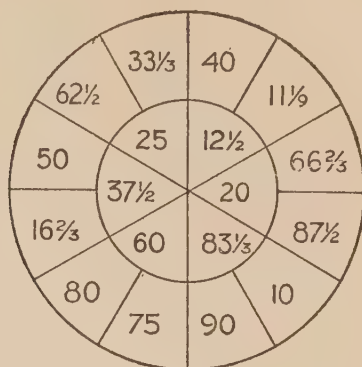
The following per cents with their fractional equivalents are so frequently used that they should be committed to memory:

$6\frac{1}{4}\% = \frac{1}{16}$	20 % = $\frac{1}{5}$	40 % = $\frac{2}{5}$	70 % = $\frac{7}{10}$
$8\frac{1}{3}\% = \frac{1}{12}$	25 % = $\frac{1}{4}$	50 % = $\frac{1}{2}$	75 % = $\frac{3}{4}$
10 % = $\frac{1}{10}$	30 % = $\frac{3}{10}$	60 % = $\frac{3}{5}$	80 % = $\frac{4}{5}$
$12\frac{1}{2}\% = \frac{1}{8}$	$33\frac{1}{3}\% = \frac{1}{3}$	$62\frac{1}{2}\% = \frac{5}{8}$	$87\frac{1}{2}\% = \frac{7}{8}$
$16\frac{2}{3}\% = \frac{1}{6}$	$37\frac{1}{2}\% = \frac{3}{8}$	$66\frac{2}{3}\% = \frac{2}{3}$	90 % = $\frac{9}{10}$

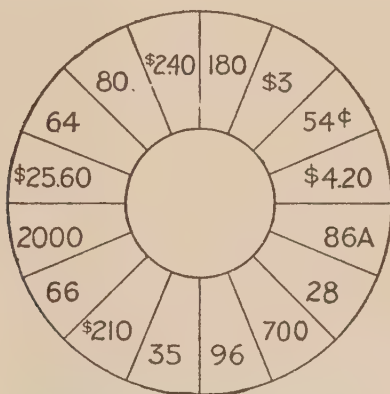
State rapidly the decimal equivalents:



State rapidly the fractional equivalents of the following %'s:



Place in center circle any per cent, as $12\frac{1}{2}$, $33\frac{1}{3}$, 20, etc.



Have pupils perform work mentally when possible, and be ready with answers in a limited time.

Repetition in this work will assure accuracy and great speed.

The examples in percentage may be classified under one of the three following principles:

- I. To find a given per cent of a number.
- II. To find what per cent one number is of another.
- III. To find a number when a percentage of it is given.

I. To find a given per cent of a number.

A. Find 16% of \$1250.

$$\begin{array}{r} \$1250. \\ .16 \\ \hline 7500 \\ 1250 \\ \hline \$200.00 \end{array}$$

B. Find 75% of \$1600.

$$\frac{\$1600 \times 3}{4} = \$1200.$$

Rule. To find a per cent of a given number, multiply the given number by the rate per cent expressed either decimally or as a common fraction. Always use the shorter method.

EXERCISE 31.

1. Find 24% of \$2846.

5. Find $33\frac{1}{3}\%$ of \$1866.

2. Find 35% of \$4850.

6. Find 200 % of \$854.50.

3. Find 60% of \$1500.

7. Find 0.25 % of \$4000.

4. Find 420% of \$6480.

8. Find $0.33\frac{1}{3}\%$ of \$9612.

9. A farmer having 450 sheep lost 8%. How many had he left?

A. $450 = \text{no. of sheep}$
 $.08$

$36.00 = \text{no. lost}$
 $414 = \text{no. left}$

B. $450 = \text{no. of sheep}$
 $.92$

900
 4050

$414.00 = \text{no. left}$

Method B is preferable. If he loses 8% of his sheep, he must have 92% left.

Much drill is desirable along this line that the pupil may at once recognize the per cent to be used as a multiplier.

10. A school numbers 580 children; 45% are boys. How many girls are there?

11. A man's income is \$1850 a year. He spends 82% of it. How much does he save?

12. A farmer raised 3840 bu. of grain, and sold 68% of it. How much did he sell?

13. I had \$2480 and spent 24% of it. How much had I left?

14. A house was bought for \$6440, and sold at a gain of 22%. What was the selling price?

$$\begin{array}{r} \text{A.} \quad \$6440 = \text{cost.} \\ \quad .22 \\ \hline \end{array}$$

$$\begin{array}{r} 12880 \\ 12880 \\ \hline \end{array}$$

$$\begin{array}{r} \$1416.80 = \text{gain} \\ \$6440. \\ \hline \end{array}$$

$$\$7856.80 = \text{selling price.}$$

$$\begin{array}{r} \text{B.} \quad \$6440 = \text{cost} \\ \quad 1.22 \\ \hline \end{array}$$

$$\begin{array}{r} 12880 \\ 12880 \\ 6440 \\ \hline \end{array}$$

$$\$7856.80 = \text{selling price.}$$

Method B is preferable.

Whenever a sale is made at profit, add the per cent gained to 100 per cent before multiplying. Whenever a sale is made at a loss, subtract the per cent lost from 100 per cent before multiplying.

16. A coal dealer buys coal at \$4.35 and sell it at a gain of 16%. What is his selling price?

17. A carriage costing \$230 was sold at a profit of $37\frac{1}{2}\%$. What was the selling price?

18. A man whose salary is \$3800 pays $11\frac{1}{2}\%$ for board and $18\frac{1}{2}\%$ for other expenses. How much does he save?

19. What is $\frac{3}{4}\%$ of \$828? What is $1\frac{3}{4}\%$ of \$828?

20. A man buys 48 yd. silk at \$1.25 per yard, 36 yd. muslin at $12\frac{1}{2}\%$ per yard. He pays 72% of the bill. How much does he still owe?

II. To find what per cent one number is of another.

If a pupil is absent from school 12 days in a period of 75 days, what per cent of the time is he absent?

$$12 \text{ da. out of } 75 \text{ da. will be } \frac{12}{75} \text{ of the time. } \frac{12}{75} = \frac{4}{25} = .16 = 16\%.$$

What per cent of 45 is 15?

$$\begin{array}{r} \text{A.} \quad \frac{15}{45} = \frac{1}{3} \\ \quad \frac{1}{3} = 33\frac{1}{3}\% \end{array}$$

$$\begin{array}{r} \text{B.} \quad .33\frac{1}{3} \\ 45 \overline{)15.00} \\ \underline{135} \\ 150 \\ \underline{150} \\ 135 \\ \underline{135} \\ 15 \end{array} \quad 33\frac{1}{3}\%$$

Rule. To find what per cent one number is of another, we first express the relation as a common fraction in its lowest terms, then change the fractional part to hundredths.

What part of 60 is 20? $\frac{1}{3}$.

What per cent of 60 is 20? $33\frac{1}{3}\%$.

EXERCISE 32

1. What per cent of 325 is 25?
2. What per cent of 175 is 125?
3. A lot of land costing \$1620 was sold for \$1863. What was the gain per cent?
4. I bought a farm for \$5500, and paid \$1200 for repairs. I sold the farm for \$7839. What per cent did I gain?
5. An agent received \$1360 for collecting a bill of \$8500. What was the rate per cent?

III. To find a number when a percentage of it is given.
\$450 is 75% of what sum?

A.

$$\begin{array}{r} 600. \\ .75 \overline{) 450.00} \wedge \\ \underline{450} \\ 00 \end{array}$$

or

$$450 = 75\%$$

$$1\% = \frac{1}{75} \text{ of } 450$$

$$100\% = 100 \times \frac{1}{75} \text{ of } 450$$

$$\frac{450 \times 100}{75} = 600$$

B.

$$75\% = \frac{3}{4}$$

$$450 = \frac{3}{4}$$

$$\begin{array}{r} 450 \\ \hline \frac{1}{4} = \frac{1}{3} \text{ of } 450 = 150 \\ \frac{4}{4} = 4 \times 150 = 600 \end{array}$$

or

$$\frac{450 \times 4}{3} = 600$$

Rule. To find a number when a percentage of it is given, divide the given percentage by the rate per cent, expressed either as a decimal or as a common fraction.

EXERCISE 33.

1. 675 T. is 60% of how many tons?
2. 118 bu. is 25% of how many bushels?
3. \$75 is $\frac{1}{2}\%$ of what number of dollars?
If $75 = \frac{1}{2}\%$, $150 = 1\%$.
 100% , or the whole, $= 150 \times 100 = \$15000$.
4. \$75 is $16\frac{2}{3}\%$ less than what amount?
 $16\frac{2}{3}\%$ less $= 83\frac{1}{3}\%$.
\$75 is $83\frac{1}{3}\%$ of what amount?
Or $\$75 = \frac{5}{6}$ of what amount?
5. 1860 yd. are 50% more than what amount of yards?
 50% more $= 150\%$.
 $1860 = 150\%$ of what number?

$$\begin{array}{r}
 1240. \\
 1.50 \wedge \overline{)1860.00} \wedge \\
 \underline{150} \\
 360 \\
 \underline{300} \\
 600 \\
 \underline{600} \\
 0
 \end{array}$$

$$\text{or } 1860 = \frac{3}{2}$$

$$\frac{620}{\frac{1860}{2} \times 2} = 1240.$$

6. The population of a certain town is 6270, which is $37\frac{1}{2}\%$ more than it was at the last census. What was it then?

7. $12\frac{1}{2}\%$ of 6440 tons is 25% of what number of tons?

8. In 1910 a tea merchant bought 6480 chests of tea, which were 10% less than he bought in 1911. How many chests did he buy in 1911?

9. 3% of 1200 is $\frac{2}{3}\%$ of what number?

10. There leaked out of a cask 10.08 gal., which was 16% of what it first contained. What did it first contain?

Profit and Loss, Insurance, Trade Discount, Commission, Taxes, and Duties are applications of Percentage, and are reckoned by the rules that govern the three principles in Percentage.

EXERCISE 34.

PROFIT AND LOSS.

1. A house that cost \$8575 was sold at a gain of 18% . What was received for it?

2. A farmer sold a lot of wheat at a profit of $12\frac{1}{2}\%$, and gained \$606.25. What was the cost?

3. A merchant buys butter at 27c a pound and sells it for 36c a pound. What % does he make?

4. A real estate dealer bought 75 A. of land at \$25 per acre, and sold the entire lot for \$2960.80. What was the gain per cent?

5. A grocer sold 220 bbl. of apples for \$467.28. If he paid \$1.45 per bbl. for the apples, and 35c a bbl. for transportation, what % did he gain?

6. A dealer bought paper at \$2.25 per ream, and sold it at 20c per quire. What % did he gain?

7. An estate was sold for \$11,220, at a loss of 12% . What was the cost?

8. What is the gain % of goods which cost \$4800, sell at a gain of \$720?

9. A farmer sold a cow for \$50, which was 80% of the cost. What was his loss?

10. A farm of 50 A. sold for \$3000, at a gain of 20%. What was the profit per acre?

The following problems often give pupils trouble:

1. A man sold 2 horses at \$274.40 each, gaining 12% on one and losing 12% on the other. What did he gain or lose?

$$100\% + 12\% = 112\%$$

$$\$274.40 = 112\% \text{ of the cost}$$

$$\$274.40 \div 1.12 = \$245, \text{ cost of 1 horse}$$

$$100\% - 12\% = 88\%$$

$$\$274.40 = 88\% \text{ of the cost}$$

$$\$274.40 \div .88 = \$311.81, \text{ cost of other horse}$$

$$\begin{array}{cc} \text{cost of 2 horses} & \text{selling price} \\ (245. + 311.81) - 548.80 = \$8.01 \text{ lost.} \end{array}$$

2. A farm was sold for \$6014 at an advance of 24%. What % would have been gained if the farm had been sold for \$5456.25?

$$\$6014 = 124\%.$$

$$6014 \div 1.24 = 4850 \text{ cost of farm.}$$

$$5456.25 - 4850. = \$606.25 \text{ gain.}$$

$$606.25 \div 4850. = 12\frac{1}{2}\% \text{ gain.}$$

Mr. Brown sold a lot of grain for \$973.50 at a gain of 18%. At what price should it have been sold to gain 25%?

INSURANCE.

The three necessary factors in Insurance are, sum insured, premium, and rate of insurance.

The *premium* is the sum paid for the insurance.

There are four common forms of Insurance: Fire, Marine, Accident, and Life.

The *policy* is the written agreement between the company and the party insured.

Property is insured for less than its full value. Why?

1. A house is valued at \$8460 and is insured for $\frac{2}{3}$ of its value at $\frac{3}{4}\%$. What is the premium.

$$\frac{2}{3} \text{ of } 8460 = 5640 \left(\frac{2}{3} \text{ of the value of the house} \right).$$

$$\frac{3}{4}\% = .00\frac{3}{4} = \frac{3}{400}$$

$$\frac{3}{400} \text{ of } 5640 = \frac{141}{10} = \$14.10 \text{ premium.}$$

2. A mill is insured for $\frac{2}{3}$ of its value at 3%. What is the value of the mill if the premium paid was \$171?

$$\$171 \div .03 = 5700.$$

$$5700 = \frac{2}{3} \text{ value of mill.}$$

$$\frac{1}{3} = \frac{1}{2} \text{ of } 5700 = 2850.$$

$$\frac{2}{3} = 3 \times 2850 = \$8550, \text{ value of mill.}$$

3. A merchant values his stock at \$12,400, and insures it for $\frac{3}{4}$ of its value. If the premium is \$124, what is the rate of insurance?

$$\frac{3}{4} \text{ of } 12,400 = 9300 \text{ (sum insured).}$$

$$\text{Divide premium by sum insured} = \text{rate of insurance.}$$

$$124 \div 9300 = .01\frac{1}{3}. \quad 1\frac{1}{3}\% = \text{rate of insurance.}$$

EXERCISE 35.

1. Find the cost of insuring a block of buildings valued at \$16,000 for $\frac{3}{4}$ of the value at $1\frac{1}{2}\%$.

2. A factory which cost \$54,000 is insured for \$36,000 at $2\frac{3}{4}\%$. If it should be totally destroyed by fire, what would be the loss to the owner? How much would the insurers lose?

3. I insure a ship worth \$48,000 at $2\frac{3}{4}\%$ on $\frac{3}{4}$ of its value; and the cargo worth \$8500 at $4\frac{1}{2}\%$ on $\frac{2}{3}$ of its value. How much do I pay for premiums?

4. My furniture is insured for $\frac{5}{8}\%$. The premium is \$35. What is the insurance?

5. What value do I place on my property when I pay a premium of \$175, the rate of insurance being $1\frac{3}{4}\%$, and the property being insured for $\frac{2}{3}$ of its value?

6. A hotel costing \$50,000 is insured for $\frac{2}{3}$ of its value. The premium is \$450. What is the rate of insurance?

7. What is the rate of insurance when a policy for \$5600 cost \$84?

8. A merchant paid \$176 for insurance on his goods. The face of the policy is \$8000. What is the rate?

TRADE DISCOUNT.

Trade or commercial discount is a reduction from the marked or list price of goods.

The *list price* is the price given in a catalogue or price list.

The *net price* is the price remaining after all discounts have been deducted.

When there are several discounts, the first discount is taken from the list price, the second discount is taken from the remainder, and so on.

Find the net price of an article listed at \$18.75 if the discounts are 20% and 10%.

List price	\$18.75	The first discount is 20% of 18.75 = 3.75.
Less 20%	<u>3.75</u>	
Remainder	15.00	
Less 10%	<u>1.50</u>	The second discount is 10% of 15.00 = 1.50.
Net price	13.50	

EXERCISE 36.

1. A dealer sold a piano listed at \$500, allowing 30% and 10% off. How much did he receive?
2. Find the net amount of a bill for \$375, subject to discounts of 25% and 10%.
3. An agent buys a machine for \$150 at a discount of 30% and $12\frac{1}{2}\%$. He sells it an advance of 5% on the list price. What is his profit?
4. What is the net cost of a bath-tub listed at \$150, and sold at a discount of 40% and 10%?
5. The list price of a lot of goods amounts to \$575. They are bought subject to the following discounts, 30% 10%, and 5%. What is the net sum paid?

COMMISSION.

Commission or *brokerage* is the amount paid to an agent for the transaction of business.

The *agent* is called a broker, collector, or commission merchant.

The *net proceeds* is the money left after the commission and other charges are paid.

A book agent receives a commission of 10%. What would be his commission on the sale of a set of encyclopedias for \$65? What would be the net proceeds?

$$\begin{array}{r}
 \$65 \\
 .10 \\
 \hline
 \$6.50
 \end{array}
 = \text{commission of agent.}$$

$$\$65 - \$6.50 = \$58.50, \text{ net proceeds.}$$

A real estate agent sold a house for \$8500 and charged \$255 for his commission. What per cent did he charge?

$$\begin{array}{r}
 .03 \\
 8500 \overline{)255.00} \\
 \underline{255.00}
 \end{array}$$

Divide the commission by the selling price to find the per cent charged.

I send to a broker \$765.51 for the purchase of wool after the commission of 2% is deducted. What is his commission?

$$\begin{aligned} & \begin{array}{r} 100\% \\ \$765.51 = \text{sum invested} \end{array} + \begin{array}{r} 2\% \\ + \text{commisison} \end{array} \\ & \$765.51 = 102\% \end{aligned}$$

$$\text{A. } \frac{765.51 \times 100}{102} = \$750.50 = \text{sum invested}$$

$$\text{or B. } 1.02 \times 750.50 = \text{sum invested}$$

$$\begin{array}{r} 1.02 \times 765.51 \\ \hline 714 \\ 515 \\ \hline 510 \\ 510 \\ \hline 0 \end{array}$$

$$\$765.51 - \$750.50 = \$15.01 \text{ commission}$$

EXERCISE 37.

1. A lawyer collected 85% of an account of \$590, charging 5% commission. What was his commission?

2. Find the weekly income of a commercial traveler who receives \$10 a week and a commission of 3% of his sales, if his sales average \$450 a week.

3. A broker sells 250 bales of cotton of 500 lb. each, at 14c per pound. The rate of commission is 3%. Freight and other expenses are \$200. Find the broker's commission, and the net proceeds of the sale.

4. A commission merchant sold 500 bbl. of flour at \$7 a barrel, and sent me a check for \$3360. What rate of commission did he charge?

5. What is the per cent of commission when an agent reserves for himself \$200 of \$6200 sent him to invest?

TAXES.

A *tax* is a sum of money assessed on a person, on property, or on the income of an individual, to defray the expenses of a town, city, county or state.

A *poll tax* is a tax assessed upon a person.

A *property tax* is a tax assessed upon property.

An *income tax* is a tax assessed upon a person's income.

Property is of two kinds:

1. Real estate consists of immovable property, as land, houses, etc.
2. Personal property consists of movable property, as money, bonds, merchandise, horses, etc.

Assessors are persons authorized to make a list of all taxable property together with its estimated value.

The estimated value is called the *assessed value*, and every property owner pays a tax on the assessed value of his property.

The *rate of taxation* varies in different communities, and from year to year, as it is regulated by the amount of taxable property and the amount of money which the community needs to meet its expenses.

The assessors determine the rate of taxation yearly by dividing the amount of money to be raised (after deducting the amount of poll taxes) by the total value of property.

A tax rate of $1\frac{3}{4}\%$ means \$17.50 on a thousand dollars, and is so stated on the tax bill.

The *collector* is the one appointed to collect the taxes, and he gives the money to the *treasurer*.

The total valuation of a town is \$825,575, and the tax levy is \$17,061.50. There are 275 poll taxes at \$2.00 each. What is Mr. Grover's tax on property assessed at \$8200?

\$2.00	\$17,061.50 whole tax
275	\$ 550.
\$550. = poll tax	\$16,511.50 property tax
.02	\$ 8200 Mr. Grover's property
825,575 $\overline{)16,511.50}$	.02
16,511.50	
	\$164.00 Mr. Grover's property tax
Rate = 2% or \$2.00 on a thousand	\$ 2.00 Mr. Grover's poll tax
	\$166.00 Mr. Grover's whole tax

EXERCISE 38.

1. The valuation of property in a certain town is \$985,500. The tax to be raised on the property is \$16,753.50. What must be the rate? How much on a thousand?

2. What is the amount of Mr. Moore's tax if he owns \$9300 worth of property, and pays a poll tax of \$2.00?

3. Mr. Ames owns property valued at \$12,560 in a town whose valuation is \$865,000. What will be his share of a tax of \$15,570?

CUSTOMS AND DUTIES.

Customs or *duties* are taxes levied by the government on imported goods.

Certain goods are on the *free list*; that is, they are admitted without duty.

Duties are reckoned:

1. At a certain per cent on the value of the goods, called *ad valorem duties*.
2. At a certain amount per pound, yard, etc., called *specific duties*.

Certain goods are subject to both *ad valorem* and *specific duties*. Government determines by an Act of Congress the duties to be paid.

INTEREST.

Charles Adams borrowed \$2500 for a year, and used it in his business. At the end of the year he paid back the money, and also paid 6 per cent of the money borrowed. How much did he pay for its use?

Henry James secured a loan from the bank of \$12,000 with which to buy a tract of land. The bank agreed to loan the \$12,000, on condition that Mr. James would pay the bank each year a sum of money equal to 5% of the loan. How much did Mr. James pay each year?

Money paid for the use of money is called *interest*.

The sum for which interest is paid is called the *principal*.

The sum of the principal and the interest is the *amount*.

Interest is reckoned at a certain per cent of the sum borrowed.

Interest at 6% means 6c on each dollar for 1 year.

The per cent of interest is called the *rate of interest*.

The rate of interest varies, generally from 2% to 6%.

Savings banks pay 3% or 4%. Good securities demand a low rate of interest.

George H. Brown borrows \$600 of John A. Briggs and agrees to pay interest at 5%. Mr. Brown should give Mr. Briggs a written promise to pay the money.

This written promise is called a *promissory note*.

A PROMISSORY NOTE.

\$600.

Boston, Feb. 1, 1911.

On demand I promise to pay to the order of

John A. Briggs

Six hundred

Dollars

with interest at 5%.

Value received.

GEORGE H. BROWN.

\$600, or the sum of money named in the note, is called the *face of the note*.

Notes should state value received, the date, face, rate, person to whom payable, and time of payment.

John A. Briggs is the *payee*, or the one to whom the money is to be paid.

George H. Brown is the *maker*, or the one who signs the note.

Find the interest on \$600 at 5% for 3 years.

$$\begin{array}{r}
 \$600 \\
 .05 \\
 \hline
 30.00 \text{ interest for 1 year at 5\%} \\
 3 \\
 \hline
 90.00 \text{ interest for 3 years at 5\%}
 \end{array}$$

To find the interest, we multiply the principal by the rate for 1 year, and the product by the number expressing the time in years.

EXERCISE 39.

Find the interest on

- | | |
|---|---|
| 1. \$1250 for 4 yr. at 6% | 9. \$ 900 for $2\frac{1}{2}$ yr. at 7% |
| 2. \$ 875 for 5 yr. at 5% | 10. \$4150 for $3\frac{1}{2}$ yr. at $4\frac{1}{2}$ % |
| 3. \$275.50 for 2 yr. at $4\frac{1}{2}$ % | 11. \$2350 for 3 yr. 6 mo. at 4%. |
| 4. \$1620 for 8 yr. at $4\frac{1}{3}$ % | 12. \$8775 for 2-yr. 3 mo. at $5\frac{1}{2}$ % |
| 5. \$9750 for 3 yr. at 4% | 13. \$ 375 for 4 yr. 4 mo. at 6% |
| 6. \$2250 for 7 yr. at 5% | 14. \$ 500 for 5 yr. 2 mo. at 3.5% |
| 7. \$ 750 for 3 yr. at 3.5% | 15. \$1200 for 4 yr. 6 mo. at 4.2% |
| 8. \$1500 for 4 yr. at 47% | |

There are many methods of computing interest.

The following method is a most practical one. It is accurate, and it does much to develop a child's mathematical resources, inasmuch as it gives him power and skill in thinking out fractional parts.

Rule for interest. Multiply the principal by the rate per cent for 1 year. Draw a line to separate this result from the work below. Take such multiples or parts of the product as will give the interest for the required time.

Find the interest on \$1250 for 3 yr. 5 mo. 10 da. at 6%.

$$\begin{array}{r}
 \$ 1250 \\
 .06 \\
 \hline
 \$ 75.00 = \text{interest for 1 yr. at 6\%} \\
 \$225. \quad = \text{interest for 3 yr. at 6\%} \\
 \$ 25. \quad = \text{interest for 4 mo. at 6\%} \\
 \$ 6.25 = \text{interest for 1 mo. at 6\%} \\
 \$ 2.083 = \text{interest for 10 da. at 6\%} \\
 \$258.333 = \text{interest for 3 yr. 5 mo. 10 da. at 6\%}
 \end{array}$$

We first find interest for 1 yr., \$75. Draw the line under it, as it is the fundamental part of the work—the part to which we constantly refer. The interest for 3 yr. = 3 times that of 1 yr. $3 \times \$75. = \$225.$

5 mo. is $\frac{5}{12}$ of 1 yr. but it is better to separate 5 mo. into 4 mo. and 1 mo.

4 mo. = $\frac{1}{3}$ of 1 yr., in this example $\$7.5 = \25 .

1 mo. = $\frac{1}{4}$ of 4 mo., in this example $\$2.5 = \6.25

10 da. = $\frac{1}{3}$ of 1 mo., in this example $\$6.25 = \2.083

Sum of \$225, \$25, \$6.25, \$2.083 = \$258.333 = desired interest.

In like manner, separate 7 mo. into 6 and 1; 8 mo. = 6, 1 and 1; 9 mo. = 4, 4, and 1; 10 mo. = 6, 3 and 1; 11 mo. = 6, 4 and 1.

The desirability of having 1 mo. appear each time is to help in computing the interest for the days.

The easy fractional parts of a month will be 15 da. = $\frac{1}{2}$; 10 da. = $\frac{1}{3}$; 6 da. = $\frac{1}{5}$; 5 da. = $\frac{1}{6}$; 3 da. = $\frac{1}{10}$; thus 21 da. = 15 and 6; 23 da. = 10, 10 and 3; 25 da. = 15 and 10; 29 da. = 10, 10, 6 and 3, etc.

EXERCISE 40.

Find the interest on

1. \$1250 for 2 yr. 5 mo. 10 da. at 5%.
2. \$1620 for 3 yr. 7 mo. 15 da. at $4\frac{1}{2}\%$.
3. \$675.50 from Jan. 1, 1910, to Aug. 16, 1915, at 5%.
4. \$2250 from Mar. 15, 1911, to Oct. 25, 1916, at 6%.
5. \$950.75 from June 7, 1912, to Dec. 30, 1915, at 4%.
6. \$1750 from Aug. 12, 1911, to Jan. 15, 1916, at $5\frac{1}{2}\%$.
7. \$1500 from Sept. 15, 1912, to Dec. 20, 1915, at 6%.
8. \$1265 from July 1, 1912, to Mar. 5, 1916, at 4%.
9. \$1630 from Feb. 4, 1911, to Oct. 24, 1915, at 5%.
10. \$540.50 from June 8, 1912, to Sept. 14, 1914, at $4\frac{1}{2}\%$.
11. \$620.75 from Nov. 17, 1910, to April 27, 1913, at $6\frac{1}{2}\%$.
12. \$1250.50 from Nov. 20, 1912, to May 14, 1916, at 5%.

RATIO AND PROPORTION.

Ratio is the relation of one number to another of the same kind, expressed by the quotient.

It is another form of division.

The ratio of 4 to 5 is expressed, 4:5.

The *ratio sign* is the colon (:), and is read *is to*.

The first number in the ratio is called the *antecedent*.

The second number in the ratio is called the *consequent*.

The antecedent and consequent are called the *terms* of the ratio.

The ratio of two numbers may be expressed in the three following ways: $3 \div 6$, $\frac{3}{6}$, or 3:6.

The value of each is $\frac{1}{2}$.

As we can multiply or divide both terms of a fraction by the same number without changing its value, so we can multiply or divide both terms of a ratio by the same number without changing its value. Thus, $3 : 6 = \frac{1}{2}$, or $6 : 12 = \frac{1}{2}$, or $1 : 2 = \frac{1}{2}$.

The term antecedent is another name for numerator or dividend; the term consequent is another name for denominator or divisor.

Find the value of the following ratios:

- | | | |
|----------------------------|-----------|---|
| 1. $3 : 27$ | $12 : 24$ | $\frac{3}{4} : \frac{1}{2}$ |
| 2. $8 : 72$ | $24 : 12$ | $5 \text{ ft.} : 20 \text{ in.}$ |
| 3. $\$2\frac{1}{2} : \15 | $44 : 10$ | $\frac{3}{4} \text{ yd.} : \frac{3}{4} \text{ ft.}$ |

4. Divide 30 cents between two boys in the ratio of 2 to 3.

Each time a division is made, 5 cents are taken, of which the first boy gets 2 of the 5, or $\frac{2}{5}$; and the other boy gets 3 of the 5, or $\frac{3}{5}$.

$$\frac{2}{5} \text{ of } 30 = 12 \quad \frac{3}{5} \text{ of } 30 = 18 \quad 12 \text{ cents and } 18 \text{ cents.}$$

The ratio $8 : 4 = 2$. The ratio $12 : 6 = 2$.

Thus the two ratios being equal to the same number, are equal to each other, and may be written $8 : 4 = 12 : 6$.

A *proportion* is an equality of ratios.

The first and last terms of a proportion are called the *extremes*.

The second and third terms of a proportion are called the *means*.

The test of a proportion is to have the product of the means equal the product of the extremes. Thus the product of the means divided by either extreme will give the other extreme; and the product of the extremes divided by either means will give the other mean.

Find the missing term, which is represented by $\times$ in the following:

$$15 : 5 = 12 : \times$$

$$\frac{5 \times 12}{15} = 4$$

Multiply the means and divide by the given extreme.

$$15 : 5 = 12 : 4$$

$$15 : \times = 12 : 4$$

$$\frac{15 \times 4}{12} = 5$$

Multiply the extremes and divide by the given mean.

$$15 : 5 = 12 : 4$$

Find the missing term:

$$1. \quad 3 : \times = 6 : 48$$

$$6. \quad 3 : \frac{1}{2} = \times : \frac{1}{16}$$

$$2. \quad 20 : 5 = 48 : \times$$

$$7. \quad \times : \frac{4}{5} = \frac{5}{8} : \frac{3}{8}$$

$$3. \quad \times : 7 = 5\frac{1}{2} : 11$$

$$8. \quad \frac{1}{8} : 10 = \times : 30$$

$$4. \quad 36 : 6 = 12 : 2$$

$$9. \quad \times : 180 = 5 : 20$$

$$5. \quad 3\frac{1}{2} : \times = 2 : \frac{3}{4}$$

$$10. \quad 25 : 75 = 1 : \times$$

A ship sailed $47\frac{1}{2}$ miles in 5 hours. How long will she be in sailing 190 miles?

Let $\times$ represent the number of hours she will be in sailing 190 miles. For convenience make $\times$ (hours) the fourth term of the proportion.

Write the ratio $5 : \times$.

5 must be the third term of the proportion, because the third and fourth terms form a ratio and must be of the same denominator.

$$\begin{array}{cccc} \text{miles} & \text{miles} & \text{hours} & \text{hours} \\ 47\frac{1}{2} & 190 & = & 5 \quad \times \\ & 5 \times 180 & = & 20 \\ & 47\frac{1}{2} & & \end{array}$$

$$47\frac{1}{2} : 190 = 5 : 20$$

We know that the ship will be longer in sailing 190 mi. than she was in sailing $47\frac{1}{2}$ mi. This shows that $\times$, the consequent of the second ratio, will be greater than its antecedent, therefore to have an equality of ratios we must make the consequent of the first ratio larger than its antecedent.

If, however, we find that $\times$, the consequent of the second ratio, is to be less than its antecedent, we must make the consequent of the first ratio less than its antecedent, that the equality of the ratios may be preserved.

In performing examples in proportion, remember that the terms of a ratio must be of the same denomination. Write the second ratio, making $\times$, the number sought, the fourth term. Always ask if the consequent of the second ratio is to be larger or smaller than its antecedent, and from the answer determine the first ratio.

EXERCISE 41.

1. James purchased 15 acres of land for \$72. How much did William have to pay for $37\frac{1}{2}$ acres at the same rate?

2. If 7 men eat $10\frac{1}{2}$ loaves of bread in a week, how many loaves will 25 men eat at the same rate in the same time?

3. A house was painted by 8 men in 6 days. How many men would be required to do the same work in 12 days?

4. If a man can perform a journey in 6 days, traveling 14 hours a day, how many days will be required if he travels only 7 hours a day?

5. Six horses consume a certain quantity of oats in 12 days. How long will the same quantity feed 36 horses?

POWERS AND ROOTS.

A *power* is the product of like factors.

The product of two like factors is the 2nd power, or *square* of that number.

9 is the square of 3 ($3 \times 3 = 9$).

16 is the square of 4 ($4 \times 4 = 16$).

25 is the square of 5 ($5 \times 5 = 25$).

The product of three like factors is the 3rd power, or *cube* of that number.

27 is the cube of 3 ($3 \times 3 \times 3 = 27$).

64 is the cube of 4 ($4 \times 4 \times 4 = 64$).

The product of four like factors is the 4th power; of five like factors is the 5th power, etc.

The *exponent* is a small figure written a little above the number at the right, and it tells how many times the number is taken as a factor.

$$6^2 = 6 \times 6 \quad 7^3 = 7 \times 7 \times 7 \quad 5^4 = 5 \times 5 \times 5 \times 5$$

The *root* of a number is one of the equal factors of the number.

The *square root* of a number is one of the two equal factors of the number.

The square root of 81 is 9; of $\frac{9}{16}$ is $\frac{3}{4}$.

The *cube root* of a number is one of the three equal factors of the number.

The cube root of 125 is 5; of $\frac{8}{27}$ is $\frac{2}{3}$.

The symbol $\sqrt{\quad}$ called the *radical sign*, written before a number, shows that the square root of the number is to be taken. $\sqrt{49} =$ square root of 49 = 7.

When some root other than the square root is desired, a small number, called the *index*, is written a little above and before the radical sign, to indicate what root is to be found. $\sqrt[3]{64} =$ cube root of 64 = 4.

$$4^2 = 16$$

$$3^2 = 9$$

$$8^2 = 64$$

$$16^2 = 256$$

$$45^2 = 2025$$

$$21^2 = 441$$

The square of a number contains twice as many figures, or one less than twice as many figures, as the root.

Therefore, for every one or two figures in the power there will be one figure in the root, and for every three or four figures in the power there will be two figures in the root. These groups of two figures are called *periods*.

Thus in every root there will be as many figures as there are periods, or fraction of a period, in the power.

Since $45 = 40 + 5$, the square of 45 may be obtained as follows:

$$40 + 5$$

$$40 + 5$$

$$40^2 + (40 \times 5)$$

$$(40 \times 5) + 5^2$$

$$\hline 40^2 + 2(40 \times 5) + 5^2$$

The square of any number made up of tens and units will contain the square of the tens + twice the product of the tens by the units + the square of the units.

Find the square root of 1225.

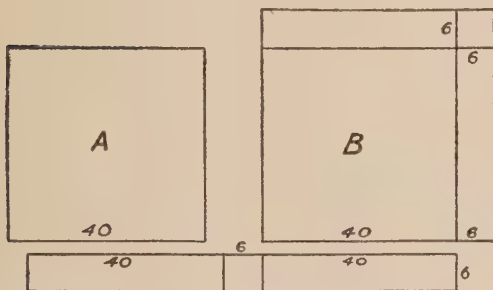
$$\begin{array}{r} 35 \\ 12 \overline{) 1225} \end{array}$$

The first period, 12, contains the square of the tens' figure of the root.

65 $\overline{) 325}$ The greatest square in 12 is 9. Write the square root of 9, which is 3, as the tens' figure of the root. Subtract the square of the tens' figure, and the remainder, together with the next period, contains twice the tens' figure $\times$ the unit $+$ the unit 2 . Twice the 3 tens is 6 tens, and 6 tens are contained in 32 tens of the remainder, 5 times. The 5 is the units figure of the root, and to save one multiplication we also add the units figure to the right of the 6 tens in the divisor. The 65 is called the complete divisor. Multiply the complete divisor and subtract. There is no remainder.

The square root of 1225 is 35.

Find the square of 46.



Start with a square 40 units wide (Figure A). What is its length?

Increase the dimensions of the square 6 units. How long will the square be? How wide?

Note that the areas added are 2 equal rectangles, each as long as a dimension of the original square, and a small square, whose dimensions will be the width of one of the rectangles (Figure B).

$40^2 = 1600$ area of original square.

$(40 \times 6) 2 = 480$ area of two rectangles.

$6^2 = 36$ area of small square.

$46^2 = 2116$ area of enlarged square.

Find the square root of 2116.

$$\begin{array}{r} 46 \\ 21 \overline{) 2116} \end{array}$$

The first period, 21, contains area of the original square, 1600. Subtracting this area, we have the remainder, 516.

516 contains the area of the two equal rectangles and the area of the small square.

We wish to find the width of the rectangles.

The length of the rectangles is 80 units, or twice the tens' figure in the root. This is our trial divisor. Divide the area of these rectangles by their length and we get 6, the width of the rectangle, or the units' figure in the root. Add this units' figure to the trial divisor, which gives the length of the two rectangles $+$ the length of the small square. This is the complete divisor, 86. Multiply the length by the width and it gives 516 square units; subtract and nothing remains.

The square root of 2116 is 46.

Always begin at the decimal point to separate the number into periods.

If the number is not a perfect square, add periods of ciphers until the root has been found to the required decimal place.

We find the square root of a common fraction by taking the square root of both numerator and denominator. If either numerator or denominator is not a perfect square, change the fraction to an equivalent decimal and then take the square root of the decimal.

Find the square root of $\frac{3}{4}$.

$$\begin{array}{r} \frac{3}{4} = .75 \qquad : \frac{8}{75} \frac{6}{66} + \\ \qquad \qquad \quad 64 \qquad \qquad \sqrt{\frac{3}{4}} = .86 + \\ 166 \overline{)1100} \\ \underline{\qquad 996} \end{array}$$

Find the square root of 6,780,816.

$$\begin{array}{r} \frac{2}{4} \frac{6}{78} \frac{0}{68} \frac{1}{16} \\ 46 \overline{)278} \\ \underline{\quad 276} \\ 5204 \overline{)20816} \\ \underline{\quad 20816} \\ \sqrt{6780816} = 2604 \end{array}$$

When a dividend does not contain a trial divisor, place 0 as the next figure in the root, and at the right of the trial divisor. Bring down the next period and proceed as before.

Rule for square root:

1. Beginning at the decimal point, separate the given number into periods of two figures each.

2. Find the greatest square in the left-hand period, and write its root above the period as the first figure of the root.

3. Subtract the square of this root figure from the left-hand period, and to the remainder annex the next period for a dividend.

4. Double the root already found for a trial divisor, and omitting the right-hand figure of the dividend, divide and write the quotient as the next figure of the root, and also at the right of the trial divisor to form the complete divisor.

5. Multiply the complete divisor by the new root figure, and subtract the product from the dividend.

6. If there is a remainder, annex the next period for a new dividend. Double the root already found for a trial divisor, and proceed as before.

EXERCISE 42.

Find the square root:

- | | |
|-----------|------------|
| 1. 38809 | 6. 430336 |
| 2. 75076 | 7. 589824 |
| 3. 142129 | 8. 788544 |
| 4. 207025 | 9. 824464 |
| 5. 310249 | 10. 998001 |

11. A square hall contains 4096 sq. ft. What will it cost to put a paper border around it at \$.37 a yard?

12. At \$.48½ a foot, what is the cost of fencing a square field containing 5476 sq. rd.?

13. The area of a square field is 654481 sq. ft. What is its perimeter?

14. How many yards of curbing are required for a park containing 26244 sq. ft.?

15. A rectangular surface is 64 rd. by 81 rd. What are the dimensions of a square field containing the same area?

16. A rectangular lot is 648 yd. long and 162 yd. wide. Find the distance around an equivalent square lot.

17. What will it cost at \$1.87½ a rod to build a fence around a square field whose area is 15½ A.?

18. How much more will it cost to fence a rectangular field 216 rd. long and 24 rd. wide, than a square field of the same area at \$2.25 a rod?

RIGHT TRIANGLE.



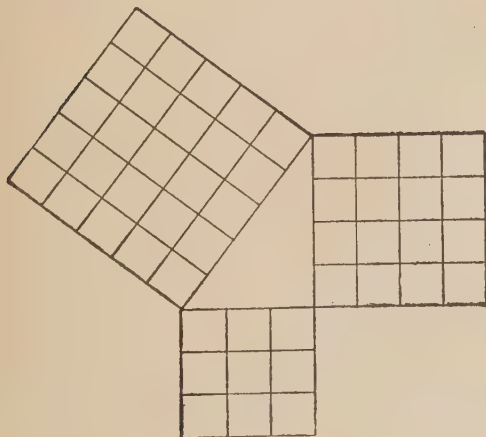
A *right triangle* is a triangle containing a right angle.

The *hypotenuse* is the side opposite the right angle. It is the longest side. The other two sides forming the right angle are called the *base* and *perpendicular*.

Draw a right triangle with the base 3 in. and perpendicular 4 in. The hypotenuse will be 5 in.

On each side of the triangle, draw a square, and divide each square into square inches. How does the number of units in the square of the hypotenuse compare with the number of units in the sum of the squares of the other two sides?

Learn—In any right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.



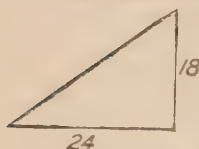
Hence, the square of either side equals the square of the hypotenuse less the square of the other side.

$$\text{hyp}^2 = \text{base}^2 + \text{perp}^2 \quad \text{hyp} = \sqrt{\text{base}^2 + \text{perp}^2}$$

$$\text{base}^2 = \text{hyp}^2 - \text{perp}^2 \quad \text{base} = \sqrt{\text{hyp}^2 - \text{perp}^2}$$

$$\text{perp}^2 = \text{hyp}^2 - \text{base}^2 \quad \text{perp} = \sqrt{\text{hyp}^2 - \text{base}^2}$$

The base of a right triangle is 24 ft., and the perpendicular is 18 ft.



What is the hypotenuse?

$$24^2 = 576 \text{ square of base.}$$

$$18^2 = 324 \text{ square of perpendicular.}$$

$$900 \text{ square of hypotenuse.}$$

$$\sqrt{900} = 30 \text{ length of hypotenuse.}$$

Rule. To find the *hypotenuse*, having the base and perpendicular given: Add the square of the base and the square of the perpendicular, and find the square root of the sum.

Rule. To find the *base* or *perpendicular*, having the hypotenuse and other side given: From the square of the hypotenuse subtract the square of the given side, and take the square root of the remainder.

EXERCISE 43.

1. The base of a right triangle is 39 ft., and the perpendicular is 52 ft. What is the hypotenuse?
2. What is the diagonal of a rectangle 96 ft. long and 72 ft. wide?
3. A tree was broken 28 ft. from its root, and struck the ground 21 ft. from its base. What was the height of the tree?
4. What must be the length of a ladder to reach to the top of a chimney 48 ft. high, the foot of the ladder being 20 ft. from the chimney?
5. If the top of the ladder mentioned above be lowered 6 feet, how far will the foot stand from the chimney?
6. Two poles are 48 ft. apart. One is 40 ft. high and the other 76 ft. How long a line will connect their tops?
7. Find the diagonal of a square field containing 4 A. 145 sq. rd.

AREA OF SURFACES.

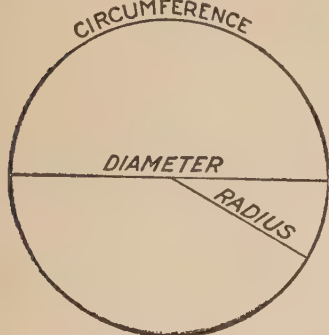
1. To find the *area* of a *rectangle*, multiply the base by the altitude.
2. To find the *area* of a *parallelogram*, multiply the base by the altitude.
3. To find the *area* of a *triangle*, multiply one-half the base by the altitude.
4. To find the *area* of a *trapezoid*, multiply one-half the sum of the bases by the altitude.

A *polygon* is a plane figure bounded by straight lines.

A *regular polygon* is a polygon having all its sides equal.

The *perimeter* of a polygon is the sum of its sides.

5. To find the *area* of a *regular polygon* of more than four sides, divide the polygon into triangles, and the area of the polygon will be the sum of the areas of the triangles.



A *circle* is a plane figure bounded by a curved line, every point of which is equally distant from the center.

The *circumference* of a circle is its bounding line.

The *diameter* is a straight line drawn through the center and terminating in the circumference.

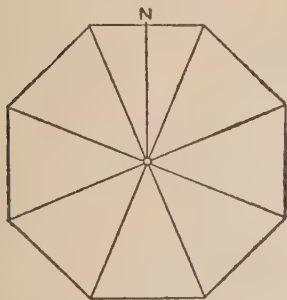
The *radius* is a straight line drawn from the center to the circumference. It is one-half of the diameter.

If the circumference of a circle is divided by its diameter, the quotient, expressed to the nearest ten-thousandth, is 3.1416. For ordinary use $3\frac{1}{4}$ may be used in place of 3.1416.

Learn. 1. To find the *circumference* of a circle multiply the diameter by 3.1416 or $3\frac{1}{4}$.

2. To find the *diameter* of a circle, divide the circumference by 3.1416 or $3\frac{1}{4}$.

$$\frac{\text{Circumference}}{\text{Diameter}} = 3.1416.$$
 This ratio is usually expressed by the Greek letter π (pi).



The area of the accompanying regular polygon (octagon) is the sum of the areas of the triangles. The area of a triangle equals $\frac{1}{2}$ the product of its base by its altitude.

The sum of the bases of the triangle = the *perimeter* of the polygon.

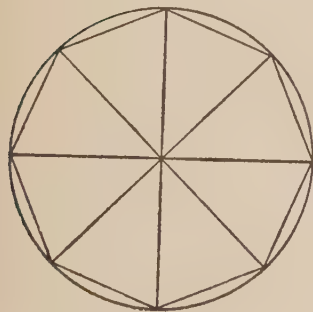
The altitude (O N) of one of the triangles is the *apothem* of the polygon.

The area of this regular polygon = $\frac{1}{2}$ of the perimeter $\times$ the apothem.

Reproduce the above regular polygon, and using the same center, draw the circumference of a circle.

Notice.—The circumference of the circle and the perimeter of the polygon are very nearly the same. Also, the apothem of the polygon and the radius of the circle are very nearly the same.

If the number of sides of the polygon were increased, the perimeter of the polygon would almost coincide with the circumference of the circle, and the apothem and radius would be the same.



Therefore, the *area* of a *circle* $= \frac{1}{2}$ the circumference multiplied by the radius.

$$\text{Circumference} = D \times 3.1416$$

$$\frac{1}{2} \text{ circumference} = R \times 3.1416$$

Substitute $R \times 3.1416$ in the above.

$$\text{Area of circle} = 3.1416 \times R \times R$$

$$\text{Area of circle} = 3.1416 \times R^2$$

$$\text{Area of circle} = \pi R^2 \text{ (the most convenient form to remember).}$$

EXERCISE 44.

1. The radius of a circle is 42 in. How many feet in its circumference?
2. What is the distance across a circular piece of ground which measures 57 rods around?
3. Find how far a carriage has gone when one of its wheels, measuring 3 ft. 8 in. in diameter, has made 1600 revolutions.
4. How long a piece of iron will a blacksmith require for the tire of wagon wheel $4\frac{1}{2}$ ft. in diameter, if 6 in. are allowed for welding?
5. A horse is tied with a rope so that his head can reach 22 ft. from the stake in any direction. What is the area of the ground over which he can graze?
6. There are two circles drawn from the same center. The circumferences measure 132 ft. and 198 ft., respectively. Find the width of the ring formed by these two circles.

RULES FOR FINDING CURVED SURFACES.

1. The *convex surface* of a *prism* is the product of the perimeter of its base by its altitude.
2. The *convex surface* of a *cylinder* is the product of the circumference of its base by its altitude.
3. The *convex surface* of a *pyramid* is one-half the product of the perimeter of its base by its slant height.
4. The *convex surface* of a *cone* is one-half the product of the circumference of its base by its slant height.
5. The *surface* of a *sphere* is four times the square of its radius times 3.1416.

RULES FOR FINDING THE VOLUME OF SOLIDS.

1. The *volume* of a *regular prism* is equal to the product of the area of its base by its altitude.
2. The *volume* of a *cylinder* is equal to the product of the area of its base by its altitude.
3. The *volume* of a *pyramid* is equal to one-third the product of the area of its base by its altitude.
4. The *volume* of a *cone* is equal to one-third the product of the area of its base by its altitude.
5. The *volume* of a *sphere* is equal to $\frac{4}{3}$ the product of its radius and its convex surface.

EXERCISE 45. (REVIEW.)

1. Complete these proportions:

$$7 : \quad = 20 : \frac{1}{5}$$

$$\frac{1}{4} : 1\frac{1}{2} = \quad : \frac{2}{3}$$

2. If 18 horses eat 80 bu. of oats in 4 weeks, how many bushels will 16 horses eat in the same time?
3. Find the 3rd power of $\frac{6}{7}$.
4. Find the square root of 65.1249.
5. A ship was valued at \$75,000, and was insured for $\frac{3}{4}$ of its value at $3\frac{1}{2}\%$. Find the premium.
6. A man bought a farm of 80 A. of land for \$3200, and sold it at a profit of \$9.50 an acre. What was the gain per cent?
7. Find the side of a square that contains as many square feet as an oblong 210 ft. $\times$ 52 $\frac{1}{2}$ ft.
8. Write the decimal for $\frac{1}{8}\%$, $\frac{4}{5}\%$, $\frac{1}{3}\%$.
9. How many pecks of potatoes are there in 48 bu., 3 pk. and 6 qt.? Find the cost of the same at 40c per peck.
10. How many bricks 8 in. $\times$ 4 in. will be required to lay a sidewalk 4 rd. long and 6 ft. wide?

EXERCISE 46.

Henry Brown has on his wood-lot a pile of wood 54 ft. long and 4 ft high, which he sells to Joseph Taylor at \$7.25 per cord.

1. Write how much money he should receive.
2. Write such a bill for the wood as Mr. Brown would make out. Receipt it yourself for Mr. Brown.

3. Write such a note as Mr. Taylor might give for the amount. Date it today, and make it payable on demand with interest.
4. Compute the interest on the note, or on the value of the wood, from date to the 27th of next month.

EXERCISE 47. (REVIEW.)

1. Find the interest on \$4050 from April 14, 1910, to June 10, 1913, at 5%.
2. Mr. Jones sold 60 bu. wheat at \$1.15 a bushel. This was 5% more than he paid for it. How much did he gain?
3. Express .625 and .1428 as common fractions in lowest terms.
4. If $\frac{3}{4}$ of a yard of silk cost \$1.15, how many yards will cost \$55.20?
5. How much did a lawyer receive for collecting a bill for \$325 at 8%, and one for \$850 at $7\frac{1}{2}\%$?
6. Find the sum of these fractions: $\frac{3}{8}$, $\frac{2}{3}$, $\frac{2}{3}$.
7. If 136 masons can build a wall in 28 days, how many will be required to build it in 8 days?
8. If a merchant sells flour at \$7.37 a barrel and gains 10%, what % would he gain if he sold it at \$8.04 a barrel?
9. What will it cost to cement a cellar floor 48 ft. 6 in. long and 24 ft. wide at 45c a sq. yd.?
10. Mr. Brown bought a horse for \$325, paid \$60 for keeping him, and then sold him for \$477.40. What per cent did he gain?

LESSON OUTLINES

AND

CLASSIFIED QUESTIONS

IN

NATURE-WORK GEOGRAPHY HISTORY BIOGRAPHY
LITERATURE THE ARTS AND SCIENCES
INDUSTRIES AND INVENTIONS

WITH PAGE REFERENCES

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INTRODUCTION

In order that our readers may readily appreciate the reliable and authentic information to be obtained from following the course of reading and study in *The Lesson Outlines*, we give a brief history of *The New Student's Reference Work*:

Over twenty years ago Mr. Beach prepared *The Student's Cyclopaedia*, the pioneer reference work that has won the approval of the educators and the public. Then, with the assistance of a large corps of leading educators, he began gathering together new and valuable material, and after a long period of such preparation *The Student's Cyclopaedia* was entirely rewritten. New ideas were incorporated, the scope of the work was so broadened that it became more than a mere cyclopaedia, and a new work in three volumes was issued under the name of *The Student's Reference Work*. This has long been recognized as the standard work of its kind.

In making the latest edition, *The New Student's Reference Work*, our aim has been, not only to maintain the high *standard* character of *The Student's Reference Work* and to keep abreast of the times, but to move ahead along the most approved lines of educational work by securing the services and suggestions of those advanced and progressive educators who represent the best thought in the educational world.

The names of the educators who have contributed to *The New Student's Reference Work* are alone a sufficient guaranty of authenticity and excellence. We wish, however, to acknowledge here the splendid assistance that has been rendered by over two hundred city superintendents, who have contributed articles, and to many other educators who have given us encouraging and helpful ideas.

The Lesson Outlines are the result of an earnest wish on the part of the publishers to render the great wealth of information contained in *The New Student's Reference Work* more accessible and helpful than is possible even with our especially devised system of cross indexing. To this end we had a series of ideal outlines for study prepared. These were arranged by educators best fitted for the task, whose only instructions were to make the most perfect outlines possible. When completed, our indexers merely inserted the page references.

The Lesson Outlines are an aid to the teacher in summarizing subjects and in its suggestions. They are helpful to the student as an aid to school work in the preparation of special topics, in reviews and in securing a comprehensive grasp of main subjects. They are of inestimable value to the young man who may be denied the advantage of a college education and must depend on his own resources to become that best product of our American civilization—"a self-educated man."

The Outlines cover the various departments of knowledge and not only give a complete synopsis of a subject, but indicate the pages in *The New Student's Reference Work* where detailed information may be

INTRODUCTION

found. Today the student must be brief and accurate, and these Outlines enable him to meet the requirements without unnecessary expenditure of valuable time and energy. Suppose, for example, that a student, teacher or general reader wishes to write a paper or get a review of English literature of the eighteenth century or, in fact, of any period of literature. In these Outlines the guide posts of the world's literature are presented so clearly and effectively that there is photographed on the mind a definite picture of the main features in the literary life of the world from before the time of Confucius down to the most modern writers of fiction. We direct your attention for a moment to the Outline on Young Folk's Literature. Every mother knows how difficult it is to select suitable stories to tell and read to young children. There is so much reading material that is really worthless thrown on the market, that it requires considerable experience to make a wise selection.

It does not require much thought to realize how completely this graded list of literature for children covers the years of early childhood, when children demand stories, then on through the restless adolescent period when every boy craves the story of excitement and adventure, into the later high school and college ages, thus covering completely the dangerous periods in the child's life. Surely the educators appreciated the truth of the saying: "In making the right start, half the battle is won."

To the Outlines is added a series of over 6000 Classified Questions. These form a means of study that, in the hands of the general public, has proven its value by many years' experience. This Question idea was first introduced in *The Student's Cyclopedia*, which we published in 1893. Inasmuch as these Classified Questions have filled a special niche in the home life for so many years, that feature has not only been retained, but has been strengthened and broadened to cover practically every department of knowledge. The editor's aim has been to select live questions which develop thought and expression, as well as fasten in the mind of the student the very meat of the subject under consideration.

Entire families have spent evening after evening in studying the questions and their answers. Parents have declared that when the long winter evenings have passed they have been amazed at the vast amount of information obtained and the studious habits acquired by every member of the household. Teachers and parents have realized that a strong home tie has been developed through this method of study, that is a closer companionship and a stronger bond of sympathy between children and parents. This spirit of confidence in the home circle becomes the trusty safeguard in the future life of the boys and girls.

In a word: *The Lesson Outlines* have been prepared and arranged with all the skill that painstaking educators could command and is the Key to the vast library of information contained in *The New Student's Reference Work*.

THE PUBLISHERS.

OUTLINES

NATURE STUDY

SPECIAL REFERENCES:

- a. As related to child life: 1307.
- b. Nature study in the lower grades: 1307.
- c. Material: 1308.
- d. Methods: 1308.
- e. The Camera in Nature Study: 1309.

ANIMAL LIFE.

- 1. MAIN CLASSES OF ANIMALS: Animal kingdom 74; arthropoda 114; vertebrates 2015; tunicates 1950; geology 2133.
 - a. Insects: Illustrations—flies 687; "darning needle" or dragon fly 549; scarabæus or tumble-bugs 1687; butterflies 296; hornets 886; silkworm moth 1757; chinch-bug 389; potato-bug 1537; fire-fly 676; peripatus 1453; cockroaches 418; cochineal 417; canker or fire worm 322.
 - b. Fishes: 678; trout 1945; bass 179; cod 418; salmon 1666; perch 1451; pike 1490; haddock 821; mudfishes 1274.
 - c. Amphibians: Frogs 719; toads 1917; and salamanders 1664.
 - d. Reptiles: 1601; snakes 1773; alligators 52; lizards 1104; tortoise 1925; turtle 1958; terrapin 1892; crocodile 480.
 - e. Birds: 217; sparrow 1791; hawk 850; robin 1620.
 - f. Mammals: 1154; cat 347; dog 538; elephant 604; monkey 1252; horse 886; house-pets 889.

2. STUDY OF INSECTS: 928.

- a. Parts of an Insect: 928; ant 76; bee 191 beetle 194.
 - (a) Antennæ or feelers, what they are like: Cockroaches 418; aphides or plant lice 82.
 - (b) Eyes: Insects 928; dragon-fly 548.
 - (c) Mouth-parts:
 - 1. Upper lip and jaws: Beetle 194; weevil 2064; ant-lion 81.
 - 2. Parts for biting and for sucking: 929; Butterfly 297; caterpillar 350; waterbug 2052.
- (1) Head: {
- (2) Thorax: 928.
 - (a) The wings and legs: Insects 929-30; crickets 477; grasshoppers 796.
- (3) Abdomen and the way it is joined to the thorax: 2050.
- b. Stages through which most insects go in developing from the egg to the full-grown adult insect: fly 687; mosquito 1269.
 - (a) Number of eggs: Bee 191; mosquito 1269.
 - (b) Where they are laid: Bee 191; fly 687; mosquito 1269; moths 1270-71.
 - (c) When laid: Moths 1270; crickets 477; grasshopper 796; lady-bug 1019.
- (1) The egg stage: 928; 297; 350. {

- (2) The larval stage—worm or caterpillar stage: Centipede 359; silkworm 1759; larva 1032; caterpillar 349.
 - (a) Food of insects in this stage of development: 1032.
 - (b) The stage in which the most damage is done: Army-worm 109; Cottonboll weevil 465.
- (3) The pupal stage—cocoon: pupa 1564; butterfly 297; silkworm 1757.
- (4) Winged stage—full grown: moth 1270; butterfly 297; ladybug 1019.
- (5) The time of development from one stage to the next: Cicada or 17 year locust 398; katydid 993.
- (6) In what form the insect lives from one summer to the next: mosquito 1269; codlin moth 419.

3. STUDY OF FISHES: 678; 677.

a. Some parts of the fish: Heart 853; 67.

- (1) The gills:
 - (a) How they are used in breathing: Respiration 1603.
 - (b) Has the fish lungs? Mudfishes 1274; fishes 678.

b. How the fish is protected: sturgeon 1841; torpedo 1924; swordfish 1858; fish-culture 677.

c. Food of the fish: 678; 1734.

d. Fish-eggs: 677; 678.

- (1) When and where laid: 1827.
- (2) Number of eggs: 589, 678.

4. STUDY OF THE FROGS—AMPHIBIANS: 719; Animal life 524; amphibia 65; salamander 1664; egg 589; blood 401; heart 854.

a. Their development:

- (1) Their Eggs: 1917.
 - (a) Appearance: 1917.
 - (b) Jelly-like part around the real egg inside and the two purposes of the jelly: Toad 1917.
 - (c) Where they are laid: Salamander 1664.
- (2) The Young Tadpole:
 - (a) Its appearance at first:
 - 1. Lack of legs: 65.
 - 2. The gills: 719; 65.
 - (b) Why it cannot live on land: 719.
- (3) The Secondary Stage of Development:
 - (a) Disappearance of gills and development of lungs: 720; 65.
 - (b) Development of a pair of hind legs, then a pair of front legs: 720; 1917.
 - (c) Shrinking of the tail: 720; 1917.
- (4) The Full-Grown Amphibian:
 - (a) Why and how can live on land: 719.
 - (b) Food of the Amphibians:
 - 1. Of what it consists.
 - 2. How it is obtained.
 - 3. The peculiarity of the tongue and how it is used in getting food.
 - (c) Amphibians as destroyers of insects: 1344; 1918.

5. STUDY OF REPTILES: 1601; 589.

a. Main kinds of reptiles: Snakes 1773; turtles 1958; alligators 52; lizards 1104; crocodile 480; dragon 548; chameleon 364; gila monster 765.

- b. Snakes: 1773; rattlesnake 1588; copperhead 452; boa 231; cobra 417.
- c. Turtles:
 - (1) Color, scales and fangs: 1773.
 - (2) Moulting of skin: 1773.
 - (3) Means of movement: 1773.
 - (a) Of what it consists: rattlesnakes 1588; copperhead 452.
 - (b) How obtained: black snake 223.
 - (c) How digested: Boa 231.
 - (4) Food:
 - (a) Protective covering of the turtle: 1958.
 - (b) Different kinds of turtles: 1959.
 - (c) Manner of swimming and diving: 1959.
 - (d) Food, how obtained, of what it consists: 1959; 1925.
 - (e) The eggs of the turtle: 1959; 589.

6. STUDY OF BIRDS:

a. Classification of birds: 217.

- (1) As to zone on the earth where found:
 - (a) Tropical birds: parrots 1425; birds of paradise 218.
 - (b) Birds of temperate zones: hawks 850; crows 482; sparrows 1791.
 - (c) Birds of cold climates: Auk 138; goose 780; migration 1223; owl 1404.
- (2) As to the habitat without regard to climate:
 - (a) Water-birds:
 - 1. Divers: like the loon 536; gull 814; albatross 39; pelican 1442.
 - 2. Swimmers: like the duck 557; goose 780; swan 1853.
 - 3. Waders: like the heron 869; crane 473; and flamingo 680.
 - (b) Shore-birds: like the snipe 1773; and plover 1505.
 - (c) Land-birds: like the quail 1570; turkey 1995; robin 1620; and bluebird 231.

b. Things to notice in studying birds:

- (1) Size—compared with some very common bird, as the robin which measures 10 inches: 1620; lark 1031; oriole 1394.
 - (a) Is it to attract attention like the Baltimore oriole's? 164.
 - (b) Is it for protection like the meadow larks? 1194.
 - (c) Notice the differences in color between the male and the female: as in the bobolink 232.
- (2) Color:
 - (3) Notice the special markings: as in the plover 1505; the owl 1404.
 - (4) The shape: as in the loon 536; the flamingo 680; the emu 613.
 - (5) The bill, wing, tail and feet: as in the pelican 1442; hummingbird 898; falcon 647; albatross 39; gull 813; peacock 1434; condor 440.
 - (6) Movements on land: as skulking the rail 1581; walking the adjutant 14; running, the sandpiper 1674; ostrich 1298; diving, the divers 536; swimming, the ducks 557.

- (7) Their movements in the air: speed, the falcon 647; endurance, the kite 1007; floating, the buzzard 297; dashing, the fly-catchers 687; the fishhawks 678.
- (8) Their songs: call-notes and alarm-notes, the Virginia nightingale 334; the canary 321; the mockingbird 1245; the bittern 221; whooping crane 473.
- (9) The food of birds, and how they obtain it: the crows 482; the adjutant 14; the vultures 2031; the hawks 850; the kingfisher 1004; the owls 1403; the nighthawks 1350.
- (10) The location and forms of their nests; the number and color of their eggs; and the way their nests are constructed: birds' nests 217; the oven-bird 1002; thrush 1907; the oriole 1394; the tailor-bird 1865; the swallow 1852; the eggs 589; bob-white 233; weaver-bird 2060.
- (11) The migration of birds: 1223.

7. STUDY OF MAMMALS:

- a. The characteristics which distinguish mammals from other animals: 1154.
- b. Important classes of mammals: 1154.
 - (1) Marsupials: 1177; kangaroo 988; opossum 1387; wombat 2105.
 - (2) Rodents: 1623; rats 1588; rabbits 1577; porcupine 1528; gophers 781; beavers 188.
 - (3) Hoofed animals: Ungulates 1966; cow 352; horse 886; pig 1856; deer 513; 1599.
 - (4) Carnivora: tiger 1911; wolf 2103; fox 703.
 - (5) Primates: Manlike animals: monkeys 1252; chimpanzees 388; apes 81.
- c. How each kind of mammal is specially fitted to live as it does: size; strength; legs; teeth; jaws; feet. (See references above.)
- d. Some domesticated mammals: House-Pets 889; dog 538; cat 347; sheep 1736; cow 352; hog 1856; horse 886.
 - (1) Animal from which each has probably developed: evolution 637. (See under above heading.)
 - (2) How they first might have been tamed: 538; 348; 886.
 - (3) Which was probably domesticated first? 352; 538; 1736.
 - (4) The relation between the teeth and the kind of food the animal eats: 886; 889; 540.
 - (5) The methods of defence of the domesticated animals: 232; 539.
 - (6) Which animals are best protected from the cold? Sheep 1736; beaver 188; bear 185.
 - (7) The relative intelligence of the different domesticated animals: 348; 539.
 - (8) Which wild animals are most like each of the main domesticated animals?

(a) Horse: 886; ass 122; zebra 2129; quagga 1569. (b) Dog: 539; wolves 2103; jackals 952. (c) Cat: 348; tiger 1911; lion 1077; leopard 1056; puma 1560; jaguar 955.	}
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- e. Two common wild animals:

(1) The squirrel: 1806; 1623. (2) The rabbit: 1577; 837.	}	(a) How the squirrel is suited to his manner of life. (b) Characteristics of his teeth, feet, tail, fur. (c) The kind of food which the squirrel eats. (d) How food is stored. (e) How he lives through the winter. (f) The summer home and the winter home.
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Note: Study with same outline as above for the squirrel, noting the difference between the rabbits and hares.

II. PLANT LIFE.

1. VARIETIES OF PLANTS:

a. Flowering plants that reproduce themselves by enclosed seed:

(1) Kinds: 73 (Angiosperms).

- (a) **Trees:** woody stem, single 1940, trunks grow at least 20 feet tall, oak 1367; maple 1166; apple 95.
- (b) **Shrubs or bushes:** woody stem — not a single main trunk, rose 1633; briar 1855.
- (c) **Vines:** woody, slender climbing stem, grape 794; ivy 950; pea 1432; Virginia creeper 2035; morning-glory 1263; clematis 407.
- (d) **Herbs:** plants with stems not woody, dying down to the ground each year, beets 1845; grass 795; grains 2073; strawberries 1837; mustard 1292; mint 1237; saxifrage 1685.

b. Flowerless plants that reproduce themselves by exposed seed:

(1) Kinds: 818 (Gymnosperms).

- (a) **Evergreens of temperate zone:** conifers 443; pine 1491; cedar 354.
- (b) **Cycads of tropics:** 492.
- (c) **Ginkgo — maidenhair tree:** 767.
- (d) **Gnetums of the deserts:** 818.

c. Flowerless plants reproduced by means of spores instead of seeds:

(1) Kinds: 1897.

- (a) **Ferns:** common forms of the woods 656.
- (b) **Mosses:** bare — soil-moss 1282; hair-moss 1270; hepatica 865; peat 1436; 1125.
- (c) **Lichens:** gray growths on fence-boards and rocks 1859.
- (d) **Algæ:** sea-weeds and slimes on surface of ponds 48; 392; 904; 491; 1463; 1609; 522.
- (e) **Fungi:** moulds — yeasts 2121; mushrooms 1284; grain smut 227; 1479; 178; 17; 1949; 1678; 1420.
- (f) **Bacteria:** 154 plants that cannot be seen with the naked eye — smaller than the finest dust 657; 761; 1633.

(2) **How reproduced:** by means of spores 1803; 1601; 1796; 117; 1804; 661.

2. MEANS OF REPRODUCTION:

a. Flowers — fitted to produce seed:

(1) **Parts:** 686.

- (a) **Stamens:** produce pollen 1808.
- (b) **Stigma:** receives pollen 686.
- (c) **Calyx:** floral display 312.
- (d) **Corolla:** 459.

(2) **Forms:** 925.

- (a) **Single.**
- (b) **Clusters.**

- (3) Fertilization: 657.
- (a) Self-pollination: 1518.
 - (b) Cross-pollination: 1518.
 - (c) By insects:
 - 1. Nectar feeding: like the butterflies and moths 1519.
 - 2. Pollen feeding: like the bees and wasps 1519; 192.
 - 3. How the insects know the food: 1519.

b. Fruits: contain mature seed 721; 1523.

- (1) Kinds: 721; pear 1434; apple 85; gourd 787; gooseberry 781; raspberry 1587.

(2) How distributed: 1717; 1519.

- (a) Wind: 1718; milkweed 1226; catalpa 348; maple 1166; tumbleweed 1950.
- (b) Water: 1718.
- (c) Animals: 1718.
- (d) Explosion of pod: violet 2022.

(3) Special adaptation for seed - distribution: 1718.

- (a) Seed wings: 1894; maple 1166; 1718.
- (b) Plumes: 1718; milkweed 1226; catalpa 348.
- (c) Barbs: 1718; dandelion 500.

c. Runners and cuttings: 1552; 1643.

d. Selections and crossing to obtain new varieties called hybrids: 1500; 789.

3. GERMINATION: 760; 657; 614; 1718.

a. Parts of seed: 611.

- (1) Covering: 931; 1894.
- (2) Cotyledon: 465.
- (3) Caulicle: 353.
- (4) Plumule: 1506.

b. Development:

- (1) Plumule developing into stem: 1747.
- (2) Radicle into the root: 1632.
- (3) Cotyledons: 611.
 - (a) Leaflike.
 - (b) Not leaflike.

4. NOURISHMENT OF PLANTS: 1366; 532; 1420; 1242; 847.

a. Green plants: that can make their own food.

- (1) Chlorophyll: green bodies that do the work 393.

(a) Work: to provide nourishment for leaf 690

- (2) Chemical changes in leaf: 1479; 18; 1041.
 - (a) Make carbohydrates and proteids: 1479.
 - (b) Give off oxygen and vapor: 1936.
 - (c) Put food in solution: 531.
 - (d) Respiration: 1602; 1210.

(3) Work of roots and stems: 2051; 1632.

b. Plants not green: having no chlorophyll, they cannot manufacture own food.

- (1) Kinds: 724; mushrooms 178; moulds 1479; mildews 117; truffles 1946; yeast 2121; rust 1649; toadstools 178.

(2) How they live: 1678; depend on green plants and on animals 1420; 1859.

(3) Where they grow: 1479.

5. ROOTS OF PLANTS: 1632; 2051.

a. Purpose: to hold fast and absorb food 1294.

b. How direction is determined: water and gravity 859.

c. Kinds: taproot and hair-roots 1632.

6. TREES:

a. Kinds: 693; 1940.

- (1) Leafshedding: 512; maple 520; 1166; oak 1367; apple 85; ash 117; elm 609; beech 192; tulip 1949; hickory 872; horse-chestnut 887; catalpa 348.
- (2) Evergreen: do not shed leaves, cypress 492; pine 1492; fir 675; hemlock 860.

b. Parts:

- (1) Roots: 1632.
 - { (a) Ascent of water: 2051.
 - { (b) Vascular bundles: 2004.
- (2) Trunk:
 - { (a) Bark: 172.
 - { 1. Differences in bark: 462.
 - { 2. Work of bark: 466.
 - { 3. Growth of bark: 621.
 - a. How wood is formed on inside: 1678; cambium 312; blast 179; trees 1940; heart-wood 854.
- (3) Wood: 1930.
 - { (a) Heartwood: 854.
 - { (b) Sapwood: 1673.
 - { (c) Rings and layers and their meaning: 1940.
- (4) Branches: 259; 818.
 - (a) Different positions in various trees: pine 1492; elm 609; hemlock 860.
 - (a) Shade trees: oak 1367.
- (5) Flowers and fruits of trees: 1367.
 - { (b) Fruit trees: 721.
 - { 1. Dry: maple 1166.
 - { 2. Fleshy: peach 1434; plum 1506; cherry 377; apple 85; pear 1435.
 - { (c) Forest trees: 693.
- (6) Leaf: 1480; Cyclic; Spiral.

7. AGRICULTURAL PLANTS:

General References: agriculture 26; balanced ration 159; ensilage 619.

a. Forage crops: 651; alfalfa 46; corn 457.

- (1) Work: benefit to soil 1353; root tubercles 1633.

b. Grains and grasses: 795; wheat 2072; rye 1650; rice 1610; oats 1638; pea 1432; millet 1227; alfalfa 46; clover 413; cowpeas 470; buckwheat 283.

- (1) Character of roots: nitrogen crops 1352; root 1632; root pressure 1633; root stock 1633; root tubercles 1633.
- (2) Stems: 795; 1821.
- (3) Flower: 795.
- (4) Difference in grains:
 - (a) Length of root: 46.
 - (b) Hardiness: 283; cowpeas 470; rye 1650; oats 1638.

c. Root crops: tuber 1948; potato 1537.

- (1) Difference in character: 1632.
- (2) Materials taken from soil: phosphates 1475; potassium 1537; sulphur 1846; nitrogen 1353; fertilizers 657; manures 1165; rotation of crops 1636.

III. PHYSICAL NATURE STUDY:

1. STUDY OF ROCKS: Geology 747; Evolution 650.

a. The main kinds of rocks in the earth's crust:

- | | |
|--|--|
| (1) Unstratified rock: | (a) Granite, rock made up of crystals
— mainly quartz: 1571; 792;
653; 1036.
1. The "hard-heads" of the fields:
553.
(b) Trap rock, dark, granular rock:
1938; 177.
1. The Palisades of the lower Hud-
son River: 1938; 894; 1571. |
| (2) Stratified rock — which
is in layers: | (a) Sandstone, rock made of grains of
sand held together by a ce-
ment: 1673; 1674.
1. Notice the material of which
gravel stones are made:
sand 1673; gravel 796.
2. "Brown stone" houses: Ohio
1374; sandstone 1674.
(b) Limestone, composed mainly of
lime: 1072.
1. "Flag stone": 1773; chalk 363;
limestone ledges 1072; mar-
ble 1167.
(c) Shale, a finely stratified rock
made from mud and silt:
1733; 406.
(d) Slate, a clay rock made from
shale by great heat: 1733.
1. Slate roofing: pencils 1444;
slates 1733.
(e) Clay, mainly from the decay and
powdering of other rock: 406.
1. Brick and potter's clay: 1538;
265. |

b. The making of rock:

- | | |
|---|--|
| (1) Igneous rock, rock
which has been mol-
ten, unstratified: | (a) The first rock of the earth: 638;
1529; 747.
(b) Granite: 792; trap rock 1938;
hardened lava 1036. |
| (2) Sedimentary rock —
stratified: | (a) Made from material deposited by
water in the ocean, lakes and
beds of streams: shale 1733;
sandstone 1674; limestone
1072.
(b) How the material is broken off
and worn away from the older
igneous rock: sand 1673; Sa-
hara 1654; earth 574; drift
553.
(c) How the material is carried by
water: alluvium 53; earth
574; chalk 363.
(d) How the material is deposited:
sand 1673; earth 574; allu-
vium 53.
(e) Cementing of the particles to-
gether by lime and silica:
pebble 1437; shale 1733; silica
1757; lime 1071.
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ogy 1231; lime 1071. |

- (3) How rock fossils are made in the sedimentary rock:
 - (a) The fossils of plant-life: fossil 701; geology 749; paleontology 1409; evolution 638.
 - (b) The kinds of plants which are shown: geology 749; fossil 701.
 - (c) The fossils of animal life which are found: horse 886; geology 750; evolution 638.
- (4) The formation of coal: 413. (Study with reference to outline.)
 - (a) Luxuriant vegetation in marshes, warm climate.
 - (b) Slight sinking of the land so as to make a shallow sea.
 - (c) Deposit of sediment material on the fallen vegetable growth.
 - (d) Increased pressure and heat to change part of the vegetable material to coal.
- (5) The stages in the making of coal: peat 1436; brown coal 1070; soft or bituminous and hard or anthracite coal 413.
- a. The making of soil:
 - (1) Kinds of soil:
 - (a) Sandy soils: 1778; 1673.
 - (b) Clayey soils: 1778.
 - (c) Vegetable soil: 1778; 1636; 53.
 - (d) Mixtures of clay and sand with vegetable matter to make sandy and clayey loam: 1165; 1353; 898.
 - (2) How the decay and disintegration of rock are brought about: the work of water, frost, temperature and glaciers: 770; physiography 1483; Sahara Desert 1654.

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- b. Height to which the air extends: 34.
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- c. Pressure of the air on the surface of the earth—amount per square inch or foot: 33.
- d. The decreasing density of the air as we ascend: aeronautics 18; air 34; barometer 174.
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- e. The characteristics of the air:
 - (1) Tasteless, odorless, colorless, elastic; it has weight and is compressible: air 33; nitrogen 1353.
 - (2) Why we do not feel its weight: 33.
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- (a) Under what conditions evaporation goes on best: 636.
- (b) Temperature and dryness of air: evaporation 636; rain 1582.
- (c) Places from which most of the water is evaporated: Sahara Desert 1654; Dead Sea 570; Tibet 1909; Atacama Desert 129.

(2) Condensation of vapor:

- (a) How condensation is brought about: rain 1582; fog 688; distillation 535; frost 720.
- (b) What is meant by the dew-point: 526.
- (c) Clouds, what they are and how formed: 412.
- (d) Fog and mist: 688.
- (e) Rain: how it is formed 1582.
- (f) Snow and hail: how they are formed and how they differ 1773; 824.
- (g) Dew and frost: what each is and how each is formed; how they differ from each other; best conditions for formation; effect of wind and clouds on formation: dew 526; frost 720; rain 1582.

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- (2) Condensation of part of the mass and the resulting increase in rate of rotation: 1316.
- (3) Throwing off of parts due to centrifugal force: 1316.
- (4) Masses making what we call planets thrown off from the sun: 1316.

b. The eight planets with their satellites: 1499; 1682; names, size and position in relation to the sun and the earth 1500; sun 1848; moon 1259; Kepler 1000.

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- (a) Rotation: time of rotation, inclination of the axis 573.
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- (1) Size: 1259.
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- (3) Character of its surface: 1209.
- (4) Its lack of atmosphere and of life: 1259.
- (5) Why its shape apparently changes: 1259; 579.

e. The fixed stars: 1813.

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- a. Proofs that it is spherical: 573; 127.

2. THE SIZE OF THE EARTH:

- a. Length of circumference and diameters: 573.

3. MOTIONS OF THE EARTH:

- a. Rotation: 573; 451; 279; 730.

- (1) What is meant by poles and axis: 573; 1516.
- (2) The Pole Star and the Big Dipper: 1516; 186.
- (3) Cause of daylight and darkness: 573; 1848.
- (4) Longitude and Time. The Meridian of Greenwich: 1204; 807; 1114; 1913.

- b. Revolution:

- (1) The Earth's orbit: 574; 451; 1000; 1344; 127; 796.
- (2) The angle of inclination: 573; 1544; 2133.
- (3) The cause of the seasons of the year: 574; 1715.

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- a. Relative location and areas: No. America 58; So. America 61; Africa 22; Asia 119; Australia 142; Europe 632.

- b. The oceans: Atlantic, 132; Pacific, 1407; Indian, 921; Arctic, 94; Antarctic, 77.

- c. The movements of the water of the oceans:

- (1) Ocean currents—causes: 1369; 813; 1017.
- (2) Tides—causes: 1910; 1259.
- (9) Waves—causes: 2058.

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- a. Work of volcanic forces:

- (1) Geysers, hot springs, volcanoes, earthquakes: 762; 2027; 1805; 574.
- (2) Rising and sinking of land: 2028; 749; 1483.

- b. Work of the atmosphere:

- (1) The changes of the atmosphere: 33; 1931; 2094; 1833; 750.
- (2) How it makes soil: 1778.
- (3) The winds: 2094; Trade, 1931; monsoon, 1253; simoom, 1759; cyclone, 492.

- c. Work of running water:

- (1) How it wears away the earth's surface: 747; 2051; 100.
- (2) How it carries earthy material and deposits sediment: 518; 1240; 590; 2122; 53.
- (3) The general effect of running water: 2051.

- d. Work of the glaciers:

- (1) How they wear away the land: 770; 1206; 365.
- (2) How they make deposits of rock and soil: 553; Soils, 1778.
- (3) Which part of the Earth has been most affected: 750.

6. DISTRIBUTION OF PLANTS AND ANIMALS ON THE EARTH:

- a. Plants:

- (1) Vegetation regions: Africa, 23; America, 59; Central America, 60; South America, 61; Asia, 119; Austria, 145; Europe, 633; France, 705; German Empire, 756; Mexico, 1215; Italy, 947; Spain, 1788.
- (2) Control by moisture, soil, heat, latitude and altitude: Iceland, 911; Soils, 1778; Agave, 25; Crops, 29; Australia 142.
- (3) How plants are adapted to conditions in which they live: 1501.
- (4) The great deserts, grasslands and forests of the world: Africa, 22; Gobi, 776; Sahara, 1654; Mohave, 1247; Australia, 142; Pampas, 1415; Tibet, 1909; Texas, 1895; Central America, 60; So. America, 61; Black Forest, 222; Forest Reserves. 693; Russia, 1646; Mexico, 1214.

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- (1) Carnivorous and herbivorous animals: 74; 678; 65; 1601; 217; 1154.
- (2) Animals of the world: See color plates and half tones 24; 62; 144; 677; 1252; 1309; 1577, 1812; 1958.

7. THE PEOPLE OF THE WORLD:

a. Races: 1578.

- (1) Their distinguishing characteristics: 22; 60; 118; 142.

II. THE CONTINENTS:

Note: Study the continental divisions, as given below, with special reference to the following outline:

1. SIZE AND POSITION IN RELATION TO OCEANS AND OTHER CONTINENTS:

a. Position on the earth.

2. CHARACTER OF COAST-LINE:

- a. Location of important bays and gulfs.
- b. The islands along the coasts.

3. SURFACE:

a. The highlands.

- (1) Mountains and plateaus, heights and areas.
- (2) Location, character, extent.

- b. Drainage and divides—the largest rivers.
- c. Coastal plains.

4. VEGETATION AND ANIMALS.

5. INHABITANTS.

III GEOGRAPHY OF THE COUNTRIES OF THE WORLD:

Note: Each of the divisions given below to be studied with the following outline:

- a. Area, location, character of surface, mountains, rivers and lakes—drainage, capitals and important cities—with reasons for importance.
- b. Climate and soils.
- c. Resources—agriculture, mining and manufacturing. Kinds, quantity, importance of products.
- d. Exports and imports.
- e. Races.

1. NORTH AMERICA: Divisions, 60; Canada and Newfoundland 316; 1341; United States, 1967; Mexico, 1214; Central America, 60; West Indies, 2070.

a. Canada and Newfoundland:

(1) Provinces:

- (a) British Columbia: 269; chief cities 2001, 2019; chief rivers 710; islands 270, 2001, 1573; mountains 1622.
- (b) Alberta: 39; chief cities 307, 583, 1058, 1197; chief rivers 1692; railroads 320, 792.
- (c) Saskatchewan: 1681; chief cities 1598, 1547; rivers 1681, 397; railroads 320, 792.
- (d) Manitoba: 2095; chief cities 2095, 260; lakes 2095, 2096, 1022; rivers 1596.
- (e) Ontario: 1385; chief cities 1924, 1399, 831, 1111, 1005, 260, 2094, 810, 1662, 1461, 1836; lakes 1022, 1352, 1383; canals 1683, 2065; water boundaries 900, 755, 1656, 524, 624, 1345, 1385, 1659, 1400; water powers 319, 1346.
- (f) Quebec: 1571; chief cities 1258, 1573, 1657, 896, 1739; rivers 1659, 1400; lakes 1658, 365, 1572.
- (g) New Brunswick: 1324; cities 1658, 1250, 712; water boundaries 724, 383, 1659, 362; rivers 1658, 1324.

- (h) **Nova Scotia:** 1362; Cape Breton Island 328; chief cities 827, 1858, 769; water boundaries 724, 132, 1659.
- (i) **Prince Edward Island:** 1547; chief city 372; railroad 1547.
- (2) **Districts and Territories:**
 - (a) **Yukon:** 2127.
 - (b) **Mackenzie:** 1138.
 - (c) **Keewatin:** 995.
 - (d) **Ungava:** 1966.
 - (e) **Franklin:** 708.
- (1) **Newfoundland 1341; Labrador 1016.**
- b. United States:**
 - (1) **New England States:** Connecticut, 443; chief cities 845, 267, 1326; Maine, 1149; chief cities 137, 166, 1532; Massachusetts, 1184; chief cities 248, 312, 2109, 1121; New Hampshire, 1325; chief cities 439, 1156; Rhode Island, 1606; chief cities 1555, 1343; Vermont, 2012; chief cities 1257, 292.
 - (2) **Middle Atlantic States:** New York 1331; chief cities 38, 1334, 285, 1860; New Jersey, 1327; chief cities 1941, 1340, 970; Pennsylvania, 1446; chief cities 843, 1496, 1465; Delaware, 516; chief cities, 547, 2090; Maryland, 1181; chief cities 74, 162; Virginia, 2023; chief cities 1612, 1355; W. Virginia, 2071; chief cities 371, 2075.
 - (3) **Southern Atlantic States:** North Carolina, 1357; chief cities 1533, 2090, 372; South Carolina, 1784; chief cities 430, 371, 804; Georgia, 752; chief cities 132, 1683, 137; Florida, 683; chief cities 1867, 954, 1868; Alabama, 35; chief cities 1244, 218.
 - (4) **Southern States of the Mississippi Valley:** Mississippi, 1240; chief cities 953, 2018, 1207; Tennessee, 1839; chief cities 1303, 1201, 1009; Louisiana, 1118; chief cities 182, 1330, 1748; Arkansas, 100; chief cities 1101, 698, 888; Texas, 1895; chief cities 141, 1671, 891; Oklahoma, 1376; chief cities 817, 1378, 1736, 619.
 - (5) **Central States:** Missouri, 1241; chief cities 966, 1659, 991, 1658, 979; Illinois, 915; chief cities 1805, 379, 1450, 1575, 1622; Iowa, 934; chief cities 523, 556, 1761, 506, 355; Wisconsin, 2098; chief cities 1142, 1229, 1850, 1578; Michigan, 1218; chief cities 1029, 523, 792, 184; Indiana, 920; chief cities 921, 635, 699, 1892, 1783; Ohio, 1373; chief cities 432, 409, 399, 1921, 509; Kentucky, 997; chief cities 707, 1119, 469, 1343; Minnesota, 1236; chief cities 1661, 1235, 559, 2096; North Dakota, 1358; chief cities 219, 648, 792; South Dakota, 1786; chief cities 1489, 1761; Nebraska, 1314; chief cities 1073, 1381, 1787; Kansas, 988; chief cities 1923, 991, 2082, 1043.
 - (6) **Plateau States:** New Mexico, 1329; chief cities 1676, 41; Colorado, 428; chief cities 521, 1559, 429, 1041; Wyoming, 2115; chief cities 379, 1030; Montana, 1254; chief cities 858, 296, 799, 66; Arizona, 100; chief cities 1473, 1949, 219, 1544; Utah, 1994; chief cities 1667, 1372; Idaho, 912; chief cities 237; Nevada, 1323; chief cities 342, 2025; California, 308; chief cities 1651, 1671, 1116, 1368; Oregon, 1391; chief cities 1664, 1532, 127; Washington, 2044; chief cities 1380, 1715, 1864, 1800.
 - (7) **Possessions:** 809; 1415; 1469; 1533; 1669; 848.
 - (8) **Districts:** 37; 535.
- c. Mexico:** Territorial Division 1216; chief cities 1213, 808, 1559, 1055; 1256; 1673, 1207, 809, 1868; Principal States 384, 1368, 2010, 2128, 1435; Volcanoes 1528, 1394, 951, 979.
- d. Central America:** Political Divisions 60, 196, 463, 809, 883, 1347, 1415, 1668; chief cities 1673, 1155.
- e. The West Indies:** Islands and Groups 2070, 157, 80, 808, 484, 825, 956, 1533 1048, 1179, 2094, 1942, 1677; chief cities 847, 1676, 1006.

2. SOUTH AMERICA:

- a. Review of physical geography: 58.
- b. Brazil: 261; chief cities 1616, 157, 1453, 1418, 1454, 1677; Rivers 57, 53, 1142, 1501, 1420, 1616, 1393.
- c. Argentina: 94; chief cities 285, 1030, 95; Rivers, 1501, 1420, 1993; Mountains, 7, 61, 94.
- d. Chile: 386; chief cities 1676, 2000, 936, 387; Islands 980, 1911, 1428.
- e. Ecuador: 580; chief cities 1576, 810, 580; Mountains 388, 464.
- f. Peru: 1456; chief cities 1071, 575, 94, 1457.
- g. Bolivia: 238; chief cities 1483, 1029, 1538, 239.
- h. Colombia: 426, 235.
- i. Venezuela: 2008, 331, 1998.
- j. Guiana: 811, 752, 1420.
- k. Uruguay: 1992, 1256, 1993.
- l. Paraguay: 1419.

3. EUROPE:

- a. Review of physical geography: 632.
- b. Great Britain and Ireland: 798, 1707, 2034, 1155, 936, 366; chief cities 1110, 1102, 772, 1156, 219, 1737, 256, 313, 1404, 556, 581, 561, 195; Colonies 24, 918, 1151, 361, 1190, 883, 142, 1873, 1339, 661, 1304, 328, 1937, 1389, 189, 1607, 493, 117, 170, 1753, 196, 2129, 777, 316, 1341, 205, 157, 956, 2094, 1048, 811, 764, 13, 1657, 1153; Places of Greatest Interest 674, 764, 1002, 847, 1734, 1025, 1897.
- c. France: 703; chief cities 1421, 1128, 1176, 246, 1071, 1928, 1299, 1656, 1637, 848, 1605; Mountains 148, 1566, 2030, 983, 55; Colonial Possessions 24, 49, 1950, 1723, 1843, 496, 716, 1141, 1604, 920, 923, 716, 1324, 2070, 435, 950, 1654, 1724, 1780, 312, 417.
- d. Spain: 1788; chief cities 1143, 171, 1998, 1729, 1181, 342; Rivers 1865, 808, 546; Colonies 1789, 24, 160, 322. Portugal: 1534; chief cities 1079, 1387; Colonies 330, 1535, 73, 149, 427, 1105, 1141, 24, 812, 1549, 1663.
- e. Belgium: 195, 681; chief cities 279, 81, 763, 1066. The Netherlands: 878; chief cities 824, 65, 1637, 1996; Possessions 966, 1846, 247, 1325, 811, 487, 1249, 1850.
- f. Denmark, Norway and Sweden: 520, 649, 803, 911, 451; 1361, 1687, 1854, 1030; chief cities 395, 202, 1827, 784.
- g. Russia: 1645; Main Divisions 674, 1512, 1749, 353, 1954, 1001, 237, 1363; chief cities 1661, 1268, 2043, 1371, 1002, 1107, 1615, 2026; Rivers 1349, 565, 1323, 537, 543, 2028.
- h. Germany: 756; chief cities 204, 829, 264, 1277, 552, 1051, 425, 707, 1365, 835; Main Divisions 183, 1555, 1686, 1756; Colonies 24, 757, 755, 760, 1001, 1325, 219, 339, 1442, 1669; Rivers 502, 1606, 2068, 594, 1371, 2026; Canals 502, 756, 321, 756.
- i. Switzerland: 1857; Mountains 55, 983, 982, 1189, 1655, 1657; Lakes 2137, 446, 743, 1122; chief cities 2137, 743, 178.
- j. Italy: 946; chief cities 1300, 1629, 1223, 744, 683, 2009, 1494; Colonies 624, 1780; Volcanoes 2017, 629, 1078.
- k. Austria-Hungary: 144; Main Divisions 236, 248, 498, 1756; chief cities 2020, 283, 1942, 1542; Mountains 55, 340; Rivers 502, 537, 1247, 2026.
- l. Roumania: 1643; chief cities 282, 965; The Balkan Peninsula: 161; San Marino: 1673.

4. ASIA:

- a. Review of physical geography: 119.
- b. Siberia: 1749, 987; Rivers 1369, 2123, 943, 1052; railway 1750; chief cities 2026, 938.
- c. Turkestan: 1954, 1001, 1414, 1873.
- d. Asiatic Turkey: 1955, 120, 1861; chief cities 447; 1666, 16, 1772, 156, 498, 1940.
- e. Syria: 1861, 208, 498, 1414; Palestine 1411, 729, 766, 970, 1314, 1380.
- f. Arabia: 87, 1282, 1244.
- g. Persia: 1455; chief cities 1863, 1880, 946; Afghanistan 21; chief cities 986, 987, 866; Baluchistan, 164.
- h. India: 918; main divisions 199, 292, 239, 1563; chief cities 305, 240, 1142, 1123, 1586, 199, 517, 1021, 354; Rivers 924, 735; Ceylon 361, 426.

- i. Indo-China: 923; Main Divisions 1922, 67, 312, 417, 1029.
- j. Chinese Empire: 389; Main Divisions 1157, 1251, 1908; chief cities 1442, 327, 1911, 1734, 834, 1299, 883.
- k. Korea: 1011, 1724.
- l. Japanese Empire: 960; chief cities 1920, 1396, 1009, 2123, 1006.
- m. Malay Archipelago: 1151, 1443; The Philippines 1469; largest islands 1125, 1230; chief city 1158.

5. AFRICA:

- a. Review of continent as a whole: 22.
 - b. Egypt: 590, 1843, 1565; chief cities 304, 45, 1530.
 - c. North Africa: Tripoli 1943; 658; Algeria, 49, 50, 1388; Tunis, 1950, 1951; Morocco, 1263, 658, 1264, 1869.
 - d. Congo Free State: 441.
 - e. British South Africa: 328.
 - (1) Cape Colony: 328; cities 330, 1530, 1002; mountains and promontories 329; rivers 1389, 1937.
 - (2) Orange River Colony: 1389; cities 228, 1389.
 - (3) Natal: 1304; cities 563, 1304, 1305.
 - (4) Transvaal: 1937; cities 1546, 973.
 - (5) Other dependencies: 180, 189, 1607.
 - f. German: 755, 24; French, 716, 717, 1843, 24; Portuguese, 1535, 1305, 2128, 24.
- See also German, French, Portuguese, Italian, Spanish and Turkish colonies above.

6. AUSTRALASIA:

- a. Australia: 142, 745, 1331, 2018, 2069.
 - (1) Queensland: 1574, 144; cities 268, 144.
 - (2) New South Wales: 1331, 143; cities 1858, 1331; rivers 504, 1282, 1331.
 - (3) Victoria: 2018, 143; chief city 1200.
 - (4) South Australia: 144.
 - (5) Western Australia: 2069, 144.
- b. Tasmania: 1873, 718, 1339.
- c. New Zealand: 1339, 449, 1522; geysers 762; cities 2067, 1340.

THE CHARTS OF HISTORY.

Note: The charts beginning opposite page 877, Vol. III, of *THE NEW STUDENT'S REFERENCE WORK* should be consulted. They supplement *The Outlines of History* by giving their subject-matter in the order of time and in parallel columns.

In these charts the landmarks of the world's history are presented by centuries. Contemporary nations are ranged side by side, each designated by a separate color, and the chief events in the history of each nation are recorded with the proper date. The contemporary events of a century are taken in at a glance, and thus the eye is brought to the aid of the mind in grasping the whole current of history. The wonderful efficiency of this method a brief study will demonstrate. It is to history what maps are to geography.

"Sounds which address the ear are lost and die
In one short hour; but that which strikes the eye
Lives long upon the mind; the faithful sight
Engraves the knowledge with a beam of light."

EXPLANATION.

The date of each century is given in heavy figures in the left margin. In Chart I note that the blue on the left represents the Hebrew nation. Going down these columns, we get the progressive history of each nation. For instance, we trace the history of the Hebrew nation from the time of Noah down to the period when, in 975 B.C., the one nation became two through the revolt of the Ten Tribes. This change is marked by a change of color under the headings Judah and Israel, and then we have the two nations instead of one. In like manner we have the history of Egypt and Greece. On the other hand, looking across the page we get the contemporary history of each century. We find that Joash in Judah, Elijah and Elisha in Israel, lived in the same century with Homer the Greek poet. In the next chart we see that in 721 B.C. the Assyrian empire, which had come into power, carried the Ten Tribes captive. So the color disappears, and its place is occupied by the color representing Assyria. We see that about 700 B.C. the Assyrian empire was overthrown and succeeded by the Babylonian empire; and later the Jews were wiped out, being carried captive to Babylon. So, by looking down this column, we get the complete history of these nations. In the same way we get the continuous history of Greece, and, in the last column, Rome. Looking across the page, we see that Hezekiah and Isaiah in Judah, the captivity of the Ten Tribes and the Epoch of the Olympiads, from which the Greeks reckoned time as we do from the time of Christ, and the founding of Rome were contemporary in the eighth century B.C. In like manner we see that the captivity of the Jews, the period of the seven wise men of Greece etc. occurred in the same century. In the next century we see that Xerxes, the mighty ruler, Ezra, Nehemiah and Malachi, the last of the Old Testament writers, were contemporary with Socrates and the Laws of the Twelve Tables, being the first time that the celebrated Roman laws were reduced to writing. Passing to later history, the next page shows the history of England, France, Germany and other nations of the world down to the sixteenth century. Looking from the top to the bottom of the first column, we will trace the history of England through these centuries. We see that the Danish kings were succeeded by the Norman kings; that the House of Plantagenet ran until 1399, when the House of Lancaster came into power, and was succeeded by the House of York and then by the House of Tudor. And so of each of the other nations. Looking across, as before, we get the contemporary history of each century.

The first six charts cover general history. We have five more which are given especially to the history of the United States and one on Canadian history. Chart VII is the colonial chart. The first thing that will attract your attention is the fact that Virginia was the oldest colony, as shown by the position of the color representing Virginia on the page. The next was New York, and the third was Massachusetts. These were the great mother colonies. We also notice that Maryland and North Carolina were originally a part of Virginia and were separated from it. So New Jersey and Delaware were part of New York; Connecticut, Rhode Island and New Hampshire were originally part of Massachusetts; South Carolina, Pennsylvania and Georgia were originally settled on the dates given. Looking across, at the top, we see that the first settlement was at Jamestown in 1607; the next on Manhattan Island by the Dutch, in 1614; and the third by the Puritans, in 1620. Looking down the column, we see that tobacco was first introduced in 1615; slavery, 1619; cotton, 1621, etc. Passing down into the next century, we have the chief events of the Revolutionary War. Then follows a chart on the history of the United States after the adoption of the Constitution. Few persons can give, in their proper order, the names of the Presidents of the United States, and tell which had one term and which two. Here they are given in a very striking way: Washington, two; Jefferson, two; Madison, two, and so on. Wherever there are two terms, the different administrations are separated by a line and the chief events of each administration are recorded. On the right we have the events which occurred in the Old World. In like manner Chart XII gives us a complete, progressive history of Canada. We thus show how simple and effective these charts are. If we think of New York, involuntarily the map is before our eye and we see just where New York stands on the coast. We see Chicago as it stands at the head of Lake Michigan. We see all the other prominent cities of the country and know just how they stand in relation to each other. We learn the positions easily and readily. How? By a study of the map. In this way geographical positions are learned easily even by young children. It is because through the eye there is photographed on the mind the position of different places to each other. Now these charts in like manner locate events. They are made very simple by placing only the landmarks of history. Heretofore, charts have defeated the very object for which they were intended, by putting on so many events that the eye was confused and burdened. Here we give only the landmarks, and in this way the trouble and confusion of studying history are forever done away with. The test of use has proved that this is the most effective method of aiding either old or young to clearly understand and remember the facts of history in their proper order, and especially to fix in the mind the contemporary events of any given century.

HISTORY

I. THE ANCIENT EGYPTIANS.

1. LOCATION OF THEIR COUNTRY: 590.
2. THE BEGINNING OF THEIR HISTORY: 591.
3. THE FOURTH DYNASTY AND ITS ACHIEVEMENTS: 591; 1368.
 - a. Date of its control: 591.
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Definition: Old classification, Monarchy, Aristocracy and Democracy.

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- a. Charlemagne's collections of poems: 368; 1087.
b. Die Minnesinger (singers of love) and their poetry: 1236; 1087; Walther von der Vogelweide 2039.
c. Das Nibelungen Lied ("The Lay of the Nibelungs"): 1347; 1987; Wagner 2032; Goetterdaemmerung 785; Rheingold 1606; Sigurd 1756; Valhalla 1999, 2035.
d. Birth of German drama in mystery and passion-plays: Miracle-Plays 1238; Oberammergau 1368; 1087; Reynard the Fox 1604.
e. The language: German 759; Platt-Deutsch 1503.

2. THE MODERN PERIOD:

- a. Luther and the German Bible: 1124; 1087; 759; German Bible 210; Melancthon 1199; Ulrich von Hutten 1087; Zwingli 2138.
b. Poetry:
(1) Epic: Klopstock 1007.
(2) Drama: Lessing 1058; Goethe 777; Arnim 109; Egmont 589; Faust 650; Iphigenia 936; Mephistopheles 1205; Schiller 1688; Tell 1886; Wallenstein 2037.
(3) Lyric: Gerhardt 755; Heine 858; Lorelei 1115; Uhland 1964; Wieland 2082.

c. Prose:

- (1) **Fiction:** 1088; legend 1048; novel 1363; mythology 1294; romance 1628; Auerbach 136; Ebers 577; Freitag 718; Grimm 806; Munchausen 1277; Reuter 1604; Platt-Deutsch 1503.
- (2) **Belles-Lettres: (Criticisms, Essays, Humor):** 1088; Lessing 1058; Richter 1612; Schlegel 1689.
- (3) **History:** 1088; Baur 183; Curtius 489; Doellinger 541; Mommsen 1249; Niebuhr 1349; Strauss 1836.
- (4) **Philosophy:** 1087; 1472; Kant 992; Fichte 659; Schelling 1688; Herbart 866; Hegel 857; Schopenhauer 1704; Lotze 1116; Leibniz 1050.
- (5) **Science:** 1088; Bunsen 289; Haeckel 822; Helmholtz 860; Hertz 870; Humboldt 890; Lassalle 1033; Liebig 1066; Marx 1180; Ritter 1617; Roentgen 1624; Schliemann 1689; Vogt 2026; Weissmann 2065.
- (6) **Theology:** Herder 867; Ritschl 1617; Schleiermacher 1689.

XXI. FRENCH.**1. THE MEDIEVAL PERIOD:**

- a. Earliest Poetry: Roland 1625; Provençal 1554.
- b. The Troubadours: 1944, 1085.
- c. Froissart and Commines: 720; 1085.

2. THE MODERN PERIOD:**a. Poetry:**

- (1) **Drama:** Bergerac 202; Corneille 398, 457 (Cid); Racine 1578; Molière 1248; Beaumarchais 187; Hugo 895; Sardou 1680; Rostand 202.
- (2) **Lyric:** Béranger 201; Hugo 895; Lamartine 1023; Leconte de Lisle 1045; Musset 1292; Marseillaise 1176.

b. Prose:

- (1) **Fiction:** Margaret of Navarre 1170; La Fontaine 1021; Le Sage 1057; Perrault 1454; Mother Goose 1270; Saint-Pierre 1662; Daudet 506; Dumas 560; Hugo 895; 1999 Valjean; Sand 1673; Sue 1843; Verne 2014; Vigny 1085; Balzac 165; Bourget 252; Gautier 741; Maupassant 1085; Zola 2133.
- (2) **Belles-Lettres (Criticism, Essays, Wit):** Academy 6; French 716; Institute 930; Rabelais 1577; Montaigne 1254; essay 826; Boileau 236; La Rochefoucauld 1032; Saint-Simon 1663; Sévigné 1729; letters 1058; Recamier 1592; Madam de Stael 1807; Remusat 1600; Sainte-Beuve 1663; Taine 1865; Girardin 768.
- (3) **History and Biography:** D'Aubigne 505; Blanc 226; Guizot 813; Michelet 1218; Napoleon III 1902; Renan 1601; Rollin 1625; Thierry 1085; Thiers 1902; Tocqueville 1919; Voltaire 2029.
- (4) **Philosophy:** 1472; 1085; Descartes 522; Cousin 468; Comte 438; science 1706.
- (5) **Science (including, also, economics, education and law):** Descartes 522; Pascal 1427; Montesquieu 1256; Hennepin 862; Rousseau 1638; interest 931; D'Alembert 497; Diderot 530; encyclopedia 614; Buffon 286; Cuvier 491; Bastiat 179; Flammarion 680; Fourier 702; Laboulaye 1016; Laplace 1030; Lavoisier 1037; Lenormant 1053; Legendre 1049; Leverrier 1060; Mascart 1183; Pasteur 1427; Réclus 1594; Saint-Hilaire 1657; Saint-Simon 1662.
- (6) **Theology:** 1085; Calvin 311; Fénelon 654; Massillon 1187; Pascal 1427; Chateaubriand 372.

XXII. CELTIC (IN ENGLISH).**1. PROSE:**

- a. Malory: 1152.

2. POETRY:

- a. King Arthur, the Holy Grail and the Table Round: Arthur 114; Grail 790; Idyls of the King 913; Round Table 1638; Tennyson 1891; *Bellicent* 198; Camelot 314; Excalibur 640; Galahad 729; Iwaine 949; Launfal 1035; Lohengrin 1109; Merlin 1207; Parsifal 2022; *Tristram* 1943.
- b. Ossian: 1397.

- 3. MYTHOLOGY: 1294; Druids 554; Fairy 646; Fenians 654; Mab 1129; *Madec* 1142; Puck 1559.

- 4. CELTS: 357; legend 1049; romance 1628.

XXIII. ENGLISH.

GENERAL REFERENCES: 1088-92; England 615; English language 617; Great Britain 728; languages 1028; Ireland 937; Saxons 1685; Scotland 1708; Wales 2034. See, also, Celtic Literature.

- 1. EARLIEST WRITINGS: Alfred 47; alliteration 53; Anglo-Saxon 73; Roger Bacon 154; ballad 161; Bede 190; *Beowulf* 201; *Cædmon* 302; Caxton 354; *Domesday Book* 542; English 618; Robin Hood 884.

2. THE FOURTEENTH CENTURY:

- a. Chaucer: 373; 1088; Becket 189; Canterbury 326; English 618; influence of Italian and French literature 1088; *Assembly of Fowls* and *Canterbury Tales* 373; 1088; 618.
- b. Wiclif: 2114; 1088; Bible 210; Vulgate 2030.

- 3. THE FIFTEENTH CENTURY: 1088; Malory 1152; Round Table 1638; Caxton 354.

4. THE SIXTEENTH CENTURY—RENAISSANCE AND ELIZABETHAN AGE:

- a. General References: 1088-9; drama 550; Elizabeth 611; Bible 210; Coverdale 469; Tindale 1915; essay 626; poetry 1509; sonnet 1781.
- b. Birth of English Drama: 1089; Marlowe 1174; Shakespeare 1733.
- c. Poetry: 1088; 618.
 - (1) Spenser: 1796; 1088.
 - (2) Shakespeare: 1733; 1089; sonnet 1781; *As you Like It* 129; *Hamlet* 831; *King Lear* 1004; *Macbeth* 1130; *Merchant of Venice* 1206; *Midsummer Night's Dream* 1222; *Othello* 1399; *Portia* 1531; *Romeo and Juliet* 1630; *The Tempest* 1886; *The Winter's Tale* 2097; Stratford-on-Avon 1836.
 - (3) Other Poets: Beaumont 187; Daniel 1088; Drayton 1088; Fletcher 1089; Greene 1089; Jonson 978, 1089; Peele 1089; Surrey 1851; Sackville 1088; Sidney 1752; Watson 1089, 2055; Wyatt 2114.
- d. Prose: Ascham 117; Bacon 154; essay 626; 1089; philosophy 1472; W. Gilbert 766; Hakluyt 825; Hooker 884; Knox 1008; Lyly 1089; Thomas More 1261; 1088; *Utopia* 1996; Raleigh 1583; Sidney 1752; Tindale 1915.

5. THE SEVENTEENTH CENTURY:

- a. Poetry: 1089; poetry 1509; sonnet 1781; Milton 1228; *Comus* 438; *Paradise Lost* 1418; Puritans 1564; Dryden 555; Cowley 469; Herbert 867; Lovelace 1089; Waller 1089.
- b. Prose:
 - (1) General References: 1089; legend 1048; novel 1863; philosophy 1471; romance 1628; science 1706.
 - (2) Authors: Baxter 184; Bunyan 290; *Pilgrim's Progress* 1490; Clarendon 404; Hobbes 1089; Leighton 1051; Locke 1106; Newton 1344; Penn 1446; Pepys 1451; Jeremy Taylor 1876; Walton 2040.

6. THE EIGHTEENTH CENTURY (the Queen Anne Age and the Georgian Era):

- a. Poetry: Pope 1527; Akenside 35; Burns 293; Collins 425; Cowper 470; Gay 741; Goldsmith 778; *Vicar of Wakefield* 2018; Johnson 976;

Hannah More 1261; Ossian 1397; Sheridan 1740; Thomson 1906; Toplady 1924; Watts 2057; Charles Wesley 2068; Young 2125.

b. Prose:

- (1) **Essays:** 626; 1090; Addison 12; Coverley 469; Steele 1820.
- (2) **Fiction:** 1090; novel 1363; romance 1628; Defoe 515; Fielding 660; Richardson 1611; Smollet 1772; Sterne 1824; Swift 1856; Broddingnag 272; Lilliput 1071.
- (3) **History:** 1090; 876; Gibbon 764; Hume 897; Robertson 1090.
- (4) **Letters:** 1058; Chesterfield 378; Junius 982; Lady Montague 1254; Walpole 2038.
- (5) **Oratory:** Burke 291; Chatham 1495; Curran 487; Erskine 625.
- (6) **Philosophy, Religion and Science:** 1090; Berkeley 203; Blackstone 223; Butler 1090; Doddridge 537; Paine 1409; Reid 1599; Adam Smith 1769.

7. THE NINETEENTH CENTURY: 1090-2:

- a. Poetry:** 1090; Austin 141; Wm. Blake 226; Browning 276; Buchanan 282; Byron 298; Campbell 316; Coleridge 429; *Ancient Mariner* 69; Crabbe 472; Hood 884; Aram 89; Heber 857; Hemans 860; Hunt 899; Keats 994; Keble 994; Landor 1025; Lytton 1128; Matthew Arnold 110; Marston 1177; Moore 1260; *Last Rose of Summer* 1038; Morris 1265; Edwin Arnold 110; Patmore 1429; Procter 1551; Rogers 1624; Rosetti 1635; Scott 1709; *Lady of the Lake* 1020; *Lay of the Last Minstrel* 1040; Lochinvar 1105; Marmion 1174; Shaw 1735; Shelley 1738; Cenci 358; Sladen 1765; Southey 1787; Madoc 1142; Swinburne 1856; Tennyson 1891; *Grail* 790; *Idyls* 913; *Merlin* 1207; *The Princess* 1548; *Round Table* 1638; Tupper 1952; William Watson 2055; Kirke White 2078; Charles Wolfe 2103.

b. Prose:

- (1) **Fiction:** 1091-2; Aguilan 33; Austen 141; Barrie 175; Bayley 1125 (*Lyall*); Besant 207; Black 221; Blackmore 223; Boothby 246; Bronte 272; Dr. Brown 275; *Marjorie Fleming* 1152; T. A. Browne 276; Bulwer 288; Caine 304; Corelli 445; Cotes 463; Dinah Mulock Craik 472; Crockett 479; Churchill 307; Cross 452; Dickens 529; *Bleak House* 226; *Christmas Carol* 395; *The Cricket* 478; *David Copperfield* 452; *Great Expectations* 799; *Old Curiosity Shop* 1328; *Oliver Twist* 1380; *Our Mutual Friend* 1401; *Pickwick Papers* 1438; Disraeli 534; George Eliot 606; *Romola* 1630; *Silas Marner* 1756; Farjeon 648; C. W. Gordon 782; Haggard 823; Harraden 842; Hardy 837; Hawkins 850; Hewlett 871; Henty 865; Hughes 894; Ingelow 927; Kingsley 1005; Hypatia 996; Kipling 1006; Le Gallienne 1049; Lever 1059; Mitford 1243; Macdonald 1134; Marryat 1176; Meredith 1206; Mille 519; Gilbert Parker 1423; Jane Porter 1531; Reade 1589; Ramée 1584; Quiller-Couch 1574; Clark Russell 1645; Leigh Richmond 1612; Olive Schreiner 1704; Scott 1709; *Bride of Lammermoor* 265; *Ivanhoe* 949; *Kenilworth* 996; *Rob Roy* 1620; *The Talisman* 1867; Stevenson 1825; Thackeray 1897; Mrs. Ward 2041; Warren 2043; John Watson 2055; Weyman 2072; Yonge 2123; Zangwill 2129.
- (2) **History and Biography:** 1091; 876; Allison 50; Arnold (Thos.) 110; Bourinot 253; Bruce 231; Buckle 1091; Carlyle 1130; Collingwood 1091; Cox 471; Creasy 1091; Creighton 1091; Cromer 480; Curzon 489; Forster 1091; Freeman 712; Froude 721; Gardiner 736; Greene 802; Grote 807; Hallam 827; Harrison 844; Lecky 1044; Lyall 1091; Macaulay 1130; Maine 1151; Martineau 1179; May 1091; Merivale 1207; McCarthy 1131; Milman 1228; Napier 1300; Norman 1356; Palgrave 1091; Paul 1091; Petrie 1462; Pollock 1091; Prothero 1553; Rawlinson 1589; Rosebery 1634; Rowton 1091; Sayce 1686; Seeley 1718; Goldwin Smith 1770; Stan-

- hope 1810; Dean Stanley 1810; Stubbs 1839; Symonds 1859; Traill 1934; Trevelyan 1091; Sharon Turner 1958.
- (3) **Essays and Criticism:** 1090-2; C. G. Allen 51; M. Arnold 110; Birrel 1092; Blouet 230; Brooke 1091; Carlyle 336; Brougham 274; Cobb 416; De Quincey 522; De Vere 1092; Dobson 1092; Dowden 547; Gladstone 771; Hamerton 830; Howitt 893; Hunt 899; Hutton 1091; Lamb 1023; Sidney Lee 1048; Mackintosh 1090; Mallock 1152; Morley 1262; Pater 1092; Pattison 1092; *Punch* 1561; Ruskin 1644; *King of the Golden River* 1003; Saintsbury 1091; Smiles 1769; Sydney Smith 1771; Stead 1815; Leslie Stephen 1091; John Wilson 2092.
- (4) **Science (including, also, economics, philology, jurisprudence and medicine):** 1091-2; Bagehot 157; S. W. Baker 158; Ball 161; Brewster 265; Clerk-Maxwell 1192; Buckland 283; Darwin 505; Davy 509; Dawson 509; Drummond 555; Faraday 648; Galton 731; Geikie 742; Kelvin 996; Kidd 1091; Layard 1040; Livingstone 1103; Lodge 1107; Lubbock 1122; Lyell 1126; Malthus 1153; Hugh Miller 1227; Mivart 1243; Murchison 1280; Osler 1397; Playfair 1504; Proctor 1551; Ramsay 1585; Rayleigh 1589; Ricardo 1610; Romanes 1628; Salisbury 1665; Selous 1721; Seton 1727; Somerville 1780; Speke 1795; H. M. Stanley 1811; Stewart 1826; Sterling 1827; Tait 1886; Tylor 1961; Tyndall 1961; Daniel Wilson 2091.
- (5) **Philosophy and Theology (including Works on Relations of Religion and Science):** 1091-2; 1471; Balfour 160; Caird 1091; Chalmers 363; Chambers 363; Fairbairn 645; Farrar 649; Flint 1091; Gore 1091; Hall 827; Hamilton 831; Lewes 1060; Liddon 1066; Manning 1161; Mansel 1091; Martineau 1179; Maurice 1091; Mill 1226; Muller (Max) 1276; Newman 1343; Pusey 1564; Robertson 1620; Spurgeon 1806; Trench 1941; Tulloch 1950; John Wesley 2068; Westcott 2069; Whately 2073; Whitefield 2078.

XXIV. CANADIAN.

G. M. Adam 10; W. J. Alexander 45; Grant Allen 51; H. M. Ami 64; Bourinot 253; George Bryce 281; Cotes 463; J. B. Crozier 482; W. H. Drummond 555; W. A. Fraser 710; Fréchette 711; C. W. Gordon 582; G. M. Grant 792; Haliburton 826; Hannay 834; Hughes 894; Maclaren 1139; Marchand 1168; Mille 519; O'Brien 1369; Gilbert Parker 1423; Selwyn 1721; Seton 1727; Shanly 1734; Daniel Wilson 2091; R. R. Wright 2112.

XXV. AMERICAN.

1. THE COLONIAL PERIOD (1607-1783):

- a. **Poetry:** Barlow 1093; Eliot 606; 1092; Hopkinson 1093; *Hail Columbia* 824; Trumbull 1093; *Yankee Doodle* 2120; 1093.
- b. **Prose:**
- (1) **History:** Berkeley 1092; Bradford 256; 1092; Byrd 1092; Captain John Smith 1770; 1092; Pocahontas 1509; Stith 1092; Winthrop 2097; 1092.
- (2) **Religious Writings:** Cotton 465; Mather 1188; 1092; Woolman 1093; Quakers 1570.
- (3) **Philosophy:** Edwards 588; 1092; Franklin 708; 1093.
- (4) **Political Writing and Oratory:** 1092-3; Adams (Sam.) 12; 1093; Hastings 1093; Henry 865; 1093; Jefferson 967, 1093; *Declaration of Independence* 513; Lee (R. H.) 1046; 1093; Warren (J.) 2043; 1093.

2. THE NATIONAL PERIOD (1783-):

a. The Rise of National Literature (1783-1860):

- (1) **Poetry (in order of time):** Frenau 1093; Key 1000, 1093; *Star Spangled Banner* 1812; Mrs. Sigourney 1756; Bryant 280; 1095; Drake 550; 1093; Woodworth 1094; Wilde 1094; Halleck 1093; Greene 1094; Payne 1432, 1094; *Home, Sweet*

Home 883; Willis 2089; 1095; Smith (S. F.) 1770; *America* 62; Longfellow 1112; 1094; *Evangeline* 625; *Hiawatha* 871; Standish 1809; Whittier 2081; *Snowbound* 1774; 1095; Holmes 880; 1094; Poe 1509; *The Raven* 1588; 1095; Lowell 1121; 1094; *Launfal* 1035; Whitman 2079; 1095; Boker 237; Read 1589; 1095; Foster 702; *My Old Kentucky Home* 1294; Alice and Phoebe Cary 344; Larcom 1031; 1097; R. H. Stoddard 1830.

(2) Prose (writers chronologically arranged):

(a) **Fiction:** Brown (C. B.) 274; Cooper 450; *Last of the Mohicans* 1033; *Leatherstocking Tales* 1043; 1094; Irving 943; *Ichabod Crane* 911; 1093; *Rip Van Winkle* 1617; Miss Sedgwick 1717; Mrs. Child 384; Goodrich 780; Hawthorne 851; 1094; *Grandfather's Chair*; *Marble Faun* 1168; Simms 1759; Mrs. Stowe 1834; 1095; Susan Warner 2042; 1097; Mrs. Whitney 1097; Trowbridge 1945; 1097; W. T. Adams 12.

(b) **Belles-Lettres (Criticism, Essays, Humor):** 1093-5; Channing 367; 1094; R. H. Dana 500; Ticknor 1910; Bulfinch 288; Emerson 612; 1094; Margaret Fuller 722; Tuckerman 1949; Shillaber 1742; Thoreau 1906; 1094; R. G. White 2078; D. G. Mitchell 1242; G. W. Curtis 489; 1097; Bayard Taylor 1875; Browne (*Artemus Ward*) 276; William Winter 2097.

(c) **History and Biography:** 1093-5; Wirt 2098; Ramsay 1585; Benton 201; Sparks 1791; Prescott 1544; 1094; Wise 2101; Bancroft 165; 1094; Hildreth 873; Thompson 1905; G. T. Curtis 489; S. W. Williams 2089; Henry Wilson 2091; Headley 853; Lossing 1116; 1095; Motley 1271; 1094; Parton 1426; 1098; Parkman 1424; 1095; Lea 1040; Fisher 677; M. C. Tyler 1961; 1098.

(d) **Oratory and Political Writing:** 1093-5; Pelatiah Webster 2064; Washington 2047; Jay 966; 1093; Dane 501; Ordinance of 1787 p. 1391; Alexander Hamilton 830; *The Federalist* 830, 966; 1519; Madison 1142; 1093; Fisher Ames 63; 1093; Monroe 1253; Gallatin 730; Clay 496; 1094; Calhoun 307; 1094; Daniel Webster 2062; 1094; Hayne 852; Everett 636; 1094; Weed 2064; Choate 393; 1094; Garrison 738; 1095; Greeley 801; Phillips 1471; 1095; Sumner 1847; 1095; Douglass 546; C. A. Dana 499; Poore 1527; Nordhoff 1355.

(e) **Philosophy and Religion:** 1093-5; Boudinot 251; Dwight 565; Leonard Bacon 154; Lyman Beecher 193; Alexander Campbell 316; Wayland 2060; Muhlenberg 1275; Bronson Alcott 42; Mark Hopkins 885; Ray Palmer 1413; Freeman Clarke 405; Theodore Parker 1423; Bowen 253; McCosh 1133; Peabody 1432; Noah Porter 1531; Henry Ward Beecher 193; H. R. Smith 1770; Storrs 1834; Collyer 425; Brace 255; Morgan Dix 537; W. T. Harris 843.

(f) **Science (including economics, jurisprudence and philology):** 1093-5; Murray 1281; Rush 1644; Noah Webster 2063; Marshall 1177; Kent 997; Alexander Wilson 2091; Story 1834; Audubon 135; Worcester 2109; Carey 334; Schoolcraft 1690; Walker (A.) 2035; Marsh 1177; Dix 536; Bache 153; Louis Agassiz 25; Guyot 817; Bar-

nard 173; Maury 1191; J. D. Dana 500; R. H. Dana, Jr., 500; Kane 988; Squier 1806; Baird 158; Chadbourne 362; Cooley 449; Winchell 2093; W. D. Whitney 2081; Wells 2067; Terhune 1892; I. L. Hayes 852.

b. The Maturity of American Literature

(1) **Poetry:** 1095-8; Leland 1052; Emily Dickinson 530; Stedman 1819; 1097; Aldrich 43; 1097; Butterworth 297; Randall 1586; *Maryland, my Maryland* 1182; Joaquin Miller 1227; Lanier 1023; Gilder 766; 1097; Carleton 334; Fawcett 651; 1097; Bates 181; Field 659; Markham 1173; Riley 1615; Wilcox 2083; Carman 336; Dunbar 561; *The Battle Hymn of the Republic* 183; Mrs. Howe 892.

(2) **Prose:**

(a) **Fiction (authors in order of time):** 1095-8; Hol-land 879; 1097; Hale 826; 1095; *Man Without a Country* 1165; R. M. Johnston 977; 1096; Lew Wallace 2036; 1098; Weir Mitchell 1243; 1096; Mrs. Barr 174; Mrs. Davis 508; Helen Hunt Jackson 953 and 1097; Stockton 1829 and 1905; Mrs. Spofford 1800; 1097; Howells 892; 1097; Eggleston (E.) 589; 1095; M. M. Dodge 538; Tourgee 1928; G. C. Eggleston 1098; Bret Harte 845; 1095; Habberton 820; Henry James 958; 1097; Mrs. Phelps—Ward 1465; 1097; Maurice Thompson 1096; G. W. Cable 300; 1097; Mrs. Burton Harrison 844; 1097; Julian Hawthorne 851; 1097; Mrs. Catherwood 1096; Mrs. Foote 692; Westcott 1097; Joel Chandler Harris 842; P. H. Hayne 1097; James Lane Allen 52; 1097; Bellamy 198; Miss French 714; 1097; Miss Murfree 1280; 1097; Lathrop 1034; Goss 1097; Hastings 1097; Robert Grant 1098; Thos. Nelson Page 1408; Marion Crawford 474; 1097; Major 1096; Mrs. Atherton 1097; Mrs. Deland 516; Mrs. Riggs 1615; 1097; Bacheller 1097; Wister 2101; Garland 737; 1097; 1098; Mrs. Wilkins-Freeman 712; 1097; Amelie Rives 1617; R. H. Davis 508; Ford 1096 G. B. McCutcheon 1134; Mrs. Craigie 472; Naylor 1097; Tarkington 1871; 1098; Churchill 397; Crane 473; 1097; Jack London 1112.

(b) **Belles-Lettres (Criticism, Essays, Humor):** 1095-8; H. W. Shaw 1735; Higginson 873; Norton 1361; Mrs. Croly 480; Mrs. Miller 1227; Clemens 408, 1095; Burroughs 295; Scudder 1711, 1098; C. W. Stoddard 1830; Burdette 290; Mable 1129; Brander Matthews 1189; Van Dyke 2003; Bangs 163; Ade 13; Dunne 562; Hapgood 836.

(c) **History (Including Biography and Autobiography):** 1095-8; Jefferson Davis 507; A. W. Stephens 1822; 1095; Sherman 1741; Curry 488; U. S. Grant 793; J. D. Cox 471; O. O. Howard 892; P. H. Sheridan 1739; Winsor 2097; 1098; H. H. Bancroft 166; Nicolay 1095; A. D. White 2077; Hurst 901; C. K. Adams 10; Foster 701; Henry Adams 10; Hay 851; 1095; Schouler 1095; Mahan 1148; 1095; Morse 1098; Holst 881; Fiske 678; 1098; Andrews 71; 1095; Rhodes 1098; H. B. Adams 10; Lodge 1107; 1098; Sloane 1767; 1098; McMaster 1140; 1098; Hart 1095; B. I. Wheeler 2075; Woodrow Wilson 2092; Tarbell 1871; Roosevelt 1631; 1098.

- (d) **Oratory and Political Writing:** 1095-8; Lincoln 1073-5; 1094; Mrs. Livermore 1102; Cox (S. S.) 471; Schurz 1705; 1098; Halsted 829; Blaine 224; Miss Dodge 538; Ingalls 926; Ingersoll 926; Watterson 2057; Reid 1599; Beveridge 208; Bryan 280.
- (e) **Philosophy and Religion (authors arranged chronologically):** Cardinal Gibbons 764; Lyman Abbott 1; Phillips Brooks 273; Gladden 770; Archbishop Ireland 958; Bishop Spalding 1789; Ladd 1019; Parkhurst 1424; Patton 1430; Barrows 175; Adler 14; Schurman 1705; Gunsaulus 816; Hillis 874.
- (f) **Science (also including economics, jurisprudence, philology and sociology):** Bascom 177; Hammond 832; Gildersleeve 766; Gilman 767; Eliot 606; Langley 1026; Powell 1541; Newcomb 1341; Flint 682; Brinton 268; Muir 1275; Henry George 752; Packard 1407; Cope 451; F. A. Walker 2035; Wright 2112; Holmes 881; Shaler 1733; Coes 465; William James 958; Kennan 997; G. S. Hall 827; S. E. Tillman 1913; Riis 1615; Coulter 466; Zahm 2128; Ely 610; E. J. James 956; Hadley 822; W. R. Harper 841; Peary 1436; Peck 1437; Albert Shaw 1735; Baldwin 160; N. M. Butler 295; Muensterberg 1274.

XXVI. AUTHORS OF OTHER LITERATURES.

Carmen Sylva (Queen Elizabeth) of Roumania: 607; *Dora d' Istria* (Princess Koltsof-Masalski) of Roumania 1010; Gorki of Russia 783; Huss of Bohemia 901; Ixtlilxochitl of Mexico 951; Kosuth of Hungary 1012; Maeterlinck of Belgium 1143; Nordau of Hungary 1354; Sienkiewicz of Poland 1753; Tolstoi of Russia 1921; Turgenev of Russia 1954; Vambéry of Hungary 2000; Ulfilas of the Goths 1964; Goths 785.

XXVII. YOUNG FOLK'S LITERATURE.

1. BOOKS FOR EARLY CHILDHOOD: 1098.

(The figures denote the pages where the subjects or authors are discussed.)

Andersen 69: <i>Fairy Tales</i> .	Kingsley 1005: <i>Greek Heroes</i> .
Baldwin: <i>The Story of Roland</i> 1625;	Kipling 1006: <i>Puck of Pook's Hill</i> and
<i>The Story of Siegfried</i> 1756; <i>The</i>	<i>Wee Willie Winkie</i> .
<i>Story of Troy</i> 1945.	Lanier 1028: <i>The Boys' King Arthur</i> .
Church: <i>Stories from Herodotus</i> 868;	Lowell: <i>Jason's Quest</i> 95; 965.
<i>Stories from The Iliad</i> 882; <i>Stories</i>	Longfellow 1112: <i>Hiawatha</i> 871.
<i>from The Odyssey</i> 1965.	Mable 1129: <i>Norse Stories</i> 1295.
Eugene Field 659: <i>Poems and Stories</i> .	<i>Mother Goose</i> 1270; 1454.
Greene: <i>King Arthur</i> 114.	Peabody: <i>Old Greek Folk-Stories</i>
Grimm 806: <i>Fairy Tales</i> .	1295.
Hawthorne, N. 851: <i>Tanglewood Tales</i>	R. L. Stevenson 1825: <i>Book of Poems</i> .
and <i>The Wonder-Book</i> .	<i>The Bible</i> 209; <i>Stories</i> .

2. BOOKS FOR LATER CHILDHOOD: 1099.

a. Fiction and Poetry:

Addison 12: <i>Sir Roger de Coverley</i>	Robert Browning 276: <i>The Pied Piper</i>
469.	and <i>How They Brought the Good</i>
Aldrich 43: <i>The Story of a Bad Boy</i> .	<i>News</i> .
<i>Arabian Nights' Tales</i> 1084.	Bunyan 290: <i>The Pilgrim's Progress</i>
Andrews: <i>Ten Boys</i> .	1490.

Mrs. Burnett 293: *Little Lord Fauntleroy*.
 Cervantes 361: *Don Quixote*.
 Clemens 408: *Huckleberry Finn and Tom Sawyer*.
 Cooper 450: *The Last of the Mohicans* 1033.
 Defoe 515: *Robinson Crusoe*.
 Dodgson 538: *Alice's Adventures and Through the Looking Glass*.
 George Eliot 606: *Silas Marner* 1756.
 Goldsmith 778: *The Deserted Village and The Vicar of Wakefield* 2018.
 Hughes 894: *Tom Brown's School-days*.
 Irving 943: *Sketches and Tales of a Traveler*.
 Kingsley: *The Water Babies*.
 Lamb 1023: *Tales from Shakespeare*.
 Macaulay 1130: *Lays of Ancient Rome* 1620.

b. Heroes and Stories of the Nations:

Dickens 629: *A Child's History of England* 615.
 Franklin 708: *Autobiography*.
 Guerber: *The Story of the English* 618.
 Higginson 873: *Young People's History of the United States* 1967; 86.
Lives: Alfred the Great 47.
 Alexander the Great 44.
 Julius Cæsar 303.
 Oliver Cromwell 481.
 Daniel Boone 244.

c. Travel and Adventure: 1099.

Samuel Champlain 365.
 Captain Cook 449.
 Christopher Columbus 430.
 Fernando de Soto 523.
 Francis Drake 549.
 John C. Fremont 713.
 Vasco da Gama 732.

d. Stories from Nature: 1099; 1307; 1309.

Ball 161: *Starland* 1813.
 Burroughs 295: *Birds and Bees* 190; 217; *Squirrels* 1806.
 Higginson 873: *Three Outdoor Papers*.
 Keyser: *Bird-Land* 217.
 Kingsley: *Madam How and Lady Why and Town-Geology*. 1099.
 Lowell 1121: *A Good Word for Winter*.
 Mathews: *Familiar Flowers*. 1099.

Masson: *Little Masterpieces. Peasant and Prince*.
 Pyle 1565: *Adventures of Robin Hood* 884.
 Ramee 1584: *A Dog of Flanders and The Nurnberg Stove*.
 Ruskin 1644: *The King of the Golden River* 1003.
 Scott 1709: *Ivanhoe* 949; *The Lady of the Lake* 1020; *Rob Roy* 1620; *Tales of a Grandfather*.
 Anna Sewall: *Black Beauty*.
 Shakspeare 1733: *The Merchant of Venice* 1206.
 Stevenson: *Treasure Island*.
 Swift 1856: *Gulliver's Travels* 272; 1071.
 Thackeray 1897: *The Rose and the Ring*.
 Warner 2042: *Being a Boy*.
 J. R. Wyss: *Swiss Family Robinson*.

Kit Carson 342.
 Robert La Salle 1032.
 Abraham Lincoln 1073.
 William Penn 1446.
 Peter the Great 1459.
 Captain John Smith 1770.
 Miles Standish 1809 and others of peculiar interest to children.
 Plutarch 1506: *Lives of Famous Men*.
 Scudder 1711: *Life of Washington* 2047.

Sven Hedin 857.
 David Livingstone 1103.
 Lewis and Clark 1060.
 Ferdinand Magellan 1144.
 Fridtjof Nansen 1299.
 H. M. Stanley 1810.

Oliver Thorne Miller 1227: *First Book of Birds and -Birds Through an Opera-Glass*.
 Pearson: *Stories of Bird-Life*. 1099.
 Seton 1727: *Krag and Johnny Bear*.
 Thoreau 1906: *Walden*.
 Torrey: *The Footpath Way*. 1099.
 Wheelock: *Nestlings in Forest and Marsh*. 1099.
 White (Gilbert): *Natural History of Selborne*. 1099.

3. IMPORTANCE OF LITERATURE FOR THE YOUNG: 1099.

4. METHODS OF TEACHING: 1099; 1100.

5. ENGLISH CLASSICS IN THE SCHOOLS: 1100

- Matthew Arnold 110; *Sohrab and Rustum*.
 Hawthorne: *Tales of the White Hills* 2079.
 Irving: *Rip Van Winkle* and *Sleepy Hollow* 911.
 Longfellow: *Courtship of Miles Standish* 42; 1809.
 Lowell: *The Vision of Sir Launfal* 1035.
 Motley 1271: *Peter the Great*.
 Schurz 1705: *Abraham Lincoln* 1073.
 Scott: *Marmion* 1104.
 Shakspere: *Julius Cæsar* 303.
 Daniel Webster 2062: *Bunker Hill Speech* 289.
 Whittier 2081: *Snowbound* 1774.

6. IMPROVED METHOD OF INTERPRETING LITERATURE: 1100.

7. PERIODICAL LITERATURE: 1100.

8. THE OPPORTUNITY OF THE HOME: 1100.

9. BOOKS ABOUT BOOKS FOR CHILDREN: 1100.

- | | |
|---|--|
| Baldwin: <i>The Book-Lover</i> . | <i>Special Method in Primary Reading;</i> |
| Chubb: <i>The Study and Teaching of English</i> . | <i>Special Method in Reading English Classics.</i> |
| Clark: <i>How to Teach Reading</i> . | Thacher: <i>The Listening Child</i> . |
| Dye: <i>The Story-Teller's Art</i> . | Van Dyke: <i>Counsel on Reading</i> . |
| Lowell: <i>Books and Reading</i> . | Wiltse: <i>The Place of the Story in Early Education</i> . |
| McMurry: <i>Oral Work with Stories;</i> | |

PHYSICS

1. PROPERTIES OF MATTER: Physics 1482; science 1706; force 692; conservation 445; perpetual motion 1454.

- 2. MECHANICS OF SOLIDS:** 1196; 1814.
- a. Fundamental units of measurement standards: 1195; 1213; 570.
 - b. Gravitation: 796; 1184.
 - c. Acceleration: dynamics 566; inertia 925.
 - d. Laws of motion: dynamics 567; least action 1042; centrifugal force 360; simple harmonic 1759.
 - e. Machines: Wheel 2074; windmill 2093; screw propeller 1711; pump 1561; lathe 1034.
 - 1. Lever: 1059.
 - 2. Pulley: 1560; 228.
 - 3. Inclined plane: 917.
 - 4. The Pendulum: 1144.
 - 5. General law of machines: 567.

3. MECHANICS OF FLUIDS: 903; 2025; 1851.

- a. Pressure in liquids due to gravity: pressure 1546; water-wheel 2053; siphon 1761.
- b. Pressure due to externally applied force: manometer 116; hydraulic motor 903; elevator 605.
- c. Pascal's experiment: 174.
- d. Specific gravity: 521.
- e. The hydrometer: 906.

4. MECHANICS OF GASES: 1508; 946; 438; 1078.

- a. Pressure of atmosphere: 33; 72.
- b. Barometers: 174.
- c. Boyle's law: 255.
- d. Diving bells: 536.
- e. Balloons and airships: 18.
- f. Airpump: 34; 1997.

5. MOLECULAR MOTION:

- a. Relative motion of molecules: Wave motion 2058; simple harmonic motion 1759.
- b. Vapor pressure:
 - 1. Dew point: 526.
 - 2. Humidity: 2051; 412; 1582.
 - 3. Evaporation: 636.

- c. Temperature: 1886; heat 855; thermometer 1900; pyrometer 1567.
- d. Elasticity: 593; testing machines 1894; Hooke's law 884.

6. STUDY OF LIGHT:

- a. Transmission of light: light 1067; ether 627; light waves 2059.
- b. Reflection: 1067; dispersion 534; heliograph 859.
- c. Refraction: 1067; diffraction 531; diffraction grating 531; spectroscope 1793; plucker tube 1506; interference 932; polarization 1515.
- d. Prisms: 1550; 1125.
- e. Optical instruments:
 - 1. Lenses: 1053; eye 643; spectacles 1793; focus 688.
 - 2. Photography: 1476; camera 315.
 - 3. Microscope: 1220.
 - 4. Telescope: 1885; opera-glass 1386; micrometer 1220; telemeter 1883; magic lantern 1144.
- f. Color: 427; color photography 1477; actinism 9.

- a. Charles' law: 370.
- b. Work: Erg 623; caloric 311; heat 856.
- c. Power: 1541; dynamometer 569; radiometer 1579.
- d. Energy: force 692; geyser 762.
- e. Specific heat: 1793; 856.
- f. Heat engines: Gas engine 740; automobile 147; steam engine 1815; governor 788; indicator 922; turbine 1153; boiler 236; stoker 1830; injector 926; safety valve 1652.
- g. Artificial refrigeration: 1598; ice machines 911.
- h. Conduction, convection and radiation of heat: heat 855; radiation 1579.

7. STUDY OF HEAT:

- i. House heating: 856.
- a. Sound and its transmission: 8.
- b. Wave motion: 2058.
- c. Velocity of sound: 8.
- d. Reflection of sound: 579.
- e. Loudness of sound: 8.
- f. Pitch: 1495.
- g. Vibration: Acoustics 8; resonance 1602; phonograph 1474; voice 2026.

8. STUDY OF SOUND:

- h. Musical instruments: Violin 2022; organ 1393; piano-forte 1487; harp 841; flute 687; lute 1124; reed 1597; bagpipe 157; saxhorn 1685; saxophone 1686; trombone 1944; cymbals 492; drum 554; tambourine 1868; guitar 813.
- i. Harmony: 838; music 1286.
- a. Magnets: 1145; 907.
- b. Magnetic field: 1145.
- c. The earth as a magnet: 1145.
- d. The compass: 435.

9. MAGNETISM:

10. STATIC ELECTRICITY: Roentgen rays 1624; cathode rays 351; Becquerel rays. 190.

- a. Current: 597; dynamo-electric machines 568; voltmeter 2029; galvanometer 731; transformers 1934; armature 104.
- b. Potential: 1537.
- c. Resistance: Ohm's law 598; Wheatstone's bridge 2074.
- d. Units of electrical measurement: 599; power 1542; ampère 65.
- e. Cells: Voltaic cell 597; battery 182; storage battery 1833.
- f. Chemical, magnetic and heating effect of the current: 597; induction coil 923; lines of force 1077; lightning arrester 1069; magnetic induction 1145; thermostat 1901.
- g. Electroplating: plating 1502; electrolysis 603.
- h. Dynamo: 568.
- i. Motor: electric motor 600; motor 1271; Niagara power 1346; trolley-cars 1943.
- j. The telegraph: 1881; wireless 1883; cable 301; telephone 1884; electric lamps 599; microphone 1220; photophone 1478; telephotography 1885; phonophone 1475; telautograph 1881.

11. CURRENT ELECTRICITY:

- DISTINGUISHED PHYSICISTS:** Archimedes 92; Galileo 730; Newton 1344; Torricelli 1925; Huygens 902; Regnault 1598; Fahrenheit 645; Celsius 357; Kepler 1000; Watt 2056; Davy 509; Faraday 648; Maxwell 1192; Hertz 870; Bunsen 289; Herschel 869; Kelvin 996; Helmholtz 860; Thomson 1906; Rowland 1639; Tesla 1894; Michelson 1218; Boyle 255; Gilbert 766; Bacon 154; Franklin 708; Cavendish 353; Galvani 731; Volta 2028; Rumford 1643; Carnot 338; Clausius 406; Joule 980; Young 2125; Fresnel 718; Draper 551; Fraunhofer 710; Kirchhoff 1006; Langley 1026; Newcomb 1341; Oersted 1372; Ohm 1375; Henry 864; Weber 2062.

BOTANY

THE SCOPE OF THE SUBJECT: Botany 249.

DIVISIONS OF THE STUDY:

Taxonomy—the classification of plants 1875.

Morphology—the forms of plants 1264.

Physiology—the activities of plants 1487.

Ecology—the environment of plants 580.

I. TAXONOMY:

THE FOUR DIVISIONS OF THE PLANT KINGDOM:

1. **Thallophytes:** meaning thallus-plant; having a characteristic plant-body 1897.
2. **Bryophytes:** having distinct alteration of generations and more complex body 281.
3. **Pteridophytes:** having a leafy and vascular sporophyte; and producing no seeds 1558.
4. **Spermatophytes:** meaning seed-plants, called flowering plants 1797.

(Note: The first three of the above divisions are called Cryptogams—plants that do not produce seeds—484. There is also a group between plants and animals called Myxomycetes: 1297.)

1. THE THALLOPHYTES: the lowest group of plants 1897.

- | | | | | |
|---|---|--|---|--|
| a. The Algae: most primitive forms of the plant kingdom 48; and making their own food with chlorophyll 393. | { | (1) The Cyanophyceæ: the blue-green algæ, or green slimes 491; coenocyte 419; Heterocyst 871. | { | (a) Protococcus forms: 1554. |
| | | (2) The Chlorophyceæ: the green algæ 392. | | (b) Conferva forms: 392. |
| | | (3) The Phæophyceæ or brown algæ: 1463; the Sargassum, making the Sargasso seas 1681. | | (c) Siphon forms: as spirogyra 1800. |
| | | (4) The Rhodophyceæ or red algæ; prized souvenirs of the seashore 1609; Lichens—intermediate forms 1065; symbiosis 1859. | | (d) Conjugate forms: or brown algæ 1463. |
| | | b. The Fungi: taking their food from other plants 724; parasites 1420; saprophytes 1678; mycelium 1293; mycorrhiza 1294. | | |

- | | | |
|---------------------------|---|--|
| (1) Four groups of fungi: | { | (a) Phycomycetes: 1479; as black-moulds, downy mildews 1224; coenocyte 419. |
| | | (b) Ascomycetes: 17; blue-moulds, truffles, 1946; and perhaps yeasts 2121; mildews 1224. |
| | | (c) Æcidiumycetes: 17; as rusts 1649; and smuts 1772. |
| | | (d) Basidiomycetes: as mushrooms 1284; toadstools 178. |

2. THE BRYOPHYTES: the second group of plants 281.

a. The Hepaticæ: the liverworts 865; rhizoids 1606.

- (1) Marchantiales: 1168; green above and with rhizoids on under surface 1606.
- (2) Jungermanniales: like delicate moss 865.

(3) **Anthrocerotales**: from which the mosses came 1270; and perhaps ferns and seed-plants 78.

b. The Musci: 1282; known as mosses, about 3000 species 1270.

(1) the sphagnum mosses: bog-mosses which form peat 1797; 1436.

(2) True mosses: 1270.

3. THE PTERIDOPHYTES: 1558.

a. The Lycopodiales: called club-mosses or ground-pines 1125.

(1) *Lycopodium*: coarse forms 1125.

(2) *Selaginella*: the "little club-mosses" 1125.

b. The Equisetales: known as horse-tails or scouring rushes 622.

c. The Filicales: known as the ferns, with about 4000 species 661.

(1) The groups of ferns:
656:

- (a) Tall swamp-ferns.
- (b) Coarse ferns of swamps and woods.
- (c) Small and medium sized ferns.
- (d) Delicate rock and wood ferns.
- (e) The brake fern — growing to seven feet.
- (f) Maiden-hair fern—most highly regarded fern.
- (g) The evergreen wood-fern.

4. THE SPERMATOPHYTES: reproducing themselves by means of seeds 1797.

a. The Gymnosperms: naked seed-plants 818.

- (1) The **Gnetums**: growing in deserts and the tropics.
- (2) The Ginkgo or maiden-hair tree 767.
- (2) The **Cycads**: probably came from the ferns 492.
- (4) The **Conifers**: the greatest group of living gymnosperms 443; containing pines 1491; spruces (fir) 675; hemlocks 860; redwoods (sequoia) 1724; cedars 354; cypresses 492; junipers 982; yews 2126.

b. Angiosperms: seeds exposed—the most recent group of plants 73.

(1) The **Monocotyledons**:
1292.

- (a) **Grasses**: 795.
- (b) **Lilies**: 1070.
- (c) **Orchids**: 1390.
- (d) **Palms**: 1412.
- (e) **Epiphytes**: air-plants 622; like Spanish moss, orchids 1390.

(2) The **Dicotyledons**:
100,000 species 530.

- (a) **First series**: morning glories 1263; phloxes 1472; gentians 744; mints 1237; verbenas 2010; composites 435; which include asters 126; thistle 1904; goldenrod 773; sunflowers 1849; chrysanthemum 396; daisy 496; sage 1653; dandelion 500.
- (b) **Second series**: buttercups 296; mustards 1292; cabbage, cauliflower, rutabaga and turnip 1292; roses 1633; common forest trees—as oak 1367; hickory 872; walnut 2038; birch 192; elm 609; poplar 1528.

II. MORPHOLOGY.

1. **THE CELL:** the unit of structure 355.

- a **Cellulose:** cell-wall 357.
 - b **Protoplasm:** the living substance of the cell 1554.
 - c **Karyokinesis:** cell division 993; as in diatoms 527; and nostoe 492.
- (1) **Meristem** or formative tissue 1207.
 - (1) **The nucleus** 1365.
 - (2) **The cytoplasm** 493.

2. **THE SPORES:** special cells for reproduction 1803.

- a **The Archegonium:** which sets apart certain cells for reproduction 91.
 - b **Asexual spore:** —formed by cell division 117.
 - c **Sexual spore:** formed by union of cells 1730.
- (1) **The sporangium:** in which the spores are formed 1803.
 - (2) **The tetrad formation:** four sister spores 1894.
 - (1) **The gametes:** or sexual cells 735.
 - (2) **The antheridium:** or male organ 78.
 - (3) **The archegonium:** or female organ 91.
 - (4) **The sperm:** the male cell 1796.
 - (5) **The oosphere:** the female cell 1385.
 - (6) **The oospore:** or fertilized egg 1385.

3. **ALTERNATION OF GENERATION:** 55.

- a. **Gametophytes:** the generation producing sex-organs 55; apogamy 83.
 - b. **Sporophytes:** the generation producing asexual spores 1804; apospory 83.
 - c. **Homospory:** in which the gametes are alike 883.
 - d. **Heterospory:** in which the gametes are unlike 871.
- (1) **Microspores:** producing male gametophyte 1221; microsporangium 1221.
 - (2) **Megaspores:** producing a female gametophyte 1199; megasporangium 1199.

4. **THE SEEDS:** which produce the flowering plants 1718.

a. **Parts of the seed:**

- (1) **The testa:** or hard coat upon which hairs and wings grow 1894.
- (2) **The embryo:** the essential part of the seed 611;
 - (a) **Cotyledons:** the first leaves developed 465.
 - (b) **Hypocotyl:** the stem-like portion beneath 907.
- (3) **The endosperm:** food tissue within embryo-sac 614.
- (4) **The perisperm:** food tissue outside embryo-sac 1452.

b. The dispersal of seeds 1717.

- (1) By currents of air: as the thistle 1904; milkweed 1226; dandelion 500;
- (2) By currents of water: from headwaters to floodplains and banks.
- (3) By animals: indigestible seeds; and grappling appendages.
- (4) By explosive fruits: forcibly discharging seeds.

5. THE SHOOT: part of the plant growing upward 1747.

a. The Stem: axis of the plant 1821.

(1) The meristem: formative tissue in all growing organs 1207.

(2) The dermatogen: the embryonic region producing epidermis 522;

- (a) The epidermis: protective covering of all higher plants 621;
- (b) The hypodermis: cells just beneath epidermis 907;
- (c) The collenchyma: having a pearly-white luster 425.
- (d) The hair: cells formed outside the epidermis 825.

(3) The periblem: the embryonic region producing cortex 1452.

(a) The cortex: tissue containing the active cells 462; the bark 172; the bast 179; the cork 456.

(4) The plerome: the embryonic region producing the stele 1504.

(a) The stele: the central region of mature stems 1821.

- 1. The vascular bundles: the conducting system 2004; sclerenchyma 1707; the xylem or wood 2118, containing the trachea 1930; the phloem or bast—for the transfer of food 1472.
- 2. The heartwood: the colored wood 854.
- 3. The sapwood: new wood through which sap flows 1678.

(5) The bud: an undeveloped shoot 283;

- a. Leaf-buds: from which the axis grows.
- b. Flower-buds: from which the flower comes.

(6) Rootstock or rhizom: an underground stem 1633.

a. The Tuber: one form of underground stem 1948; as potato 1537.

(7) The node: joints in the stem 1354.

(8) The internodes: portions of stem between the nodes 933.

b. The Branch: a repetition of the axis of stem 259.

(1) Dichotomous branching: axis dividing into two branches 529.

(2) Monopodial branching: giving of branches from side of stem 259.

(3) Chladophyll: branches which replace leaves 403.

(4) The axil: where branches normally arise 149.

c. The Leaf: expanded organ of higher plants, for displaying green tissue to air and sunlight 1041.

(1) Deciduous leaves: growing off every year 512.

(2) **Phyllotaxy or the arrangement of leaves.**

- (a) **The verticillate or cyclic arrangement:** two or more leaves at one node 1480.
- (b) **The alternate or spiral arrangement:** single leaf at each node 1480.
- 1. **Angular divergence:** how obtained.

(3) **Structure of the leaf.**

- (a) **External:** blade — expanded part of the leaf 1041; petiole — stalk upon which the leaf grows 1461; stipules — appendages at the axil 1827.
- (b) **Internal:** epidermis — upper and lower surfaces of leaf 622; stomata 1831; cuticle 490; mesophyll — giving the leaf its color 1209; chloroplast 393; vein ends — penetrating among mesophyll cells 1041.
- (c) **Closed venation:** parallel veined leaves, as in grass and the lily 1041.
- (d) **Open venation:**
 - net-veined or
 - reticulate
 - 1. Pinnate leaves.
 - 2. Palmate leaves.

(4) **Special forms in leaf structure:** 1042; bracts 255; cupule 487; palet 1411; glumes 775; scales 1686; bulb 286; spines 1799; tendril 1888; pitcher plants 1495; carnivorous plants 338.

(5) **Position of leaf:**

- (a) **Dorsiventral:** exposing two surfaces to different conditions 545.
- (b) **Radial:** all sides exposed alike 545.
- (c) **Profile:** one edge turned toward intense sunlight, as compass-plants 435.

6 **THE ROOT:** that part of the plant growing downward 1632.

- a. **Epidermis:** the outside covering.
- b. **Cortex:** more or less thickened.
- c. **Axis:** the woody central part.
- d. **Root-cap:** that protects the tip cells in burrowing.
- e. **Root-hairs:** to help the root in absorbing.
- f. **Root tubercles:** which supply the plant with nitrogen 1633.
- g. **Rhizoids:** holdfasts and absorbing organs 1606.
- h. **Mycorrhiza:** aiding roots in absorbing 1294.

7. **THE FLOWER:** a modified shoot of seed-plants 685.

a. **Where and how the flowers grow:** 925.

- (1) **Solitary:** occurring solitary upon plants.
- (2) **Inflorescence:** clusters of flowers.

(a) **The botryose type:** lowest flowers the oldest—prominent botryose types of inflorescence: raceme; panicle; thyrsus; corymb; umbel; spike; spikelet; head; ament or catkin; spadix.

(b) **The cymose type:** topmost flowers the oldest—cyme cluster, resembling the corymb.

b. Structure of the flowers:

(1) **The receptacle or torus:** in which the floral organs are inserted 1592.

(2) **The floral organs:**

- | | | |
|--|---|---|
| <p>(a) Floral leaves:
the two outer sets of organs:</p> | <p>1. The calyx: 312; composed of sepals 1724.
2. The corolla: 459; composed of petals 1459.</p> | |
| <p>(b) Sporangial leaves:
the two inner sets of organs:</p> | <p>1. The stamens:
outermost set of sporangial leaves 1808.</p> | <p>a. The filament: a stalk-like portion 661.
b. The anther: which bears pollen 78; pollen 1518; connective 445.</p> |
| | <p>2. The carpels: inner set of sporangial leaves 340.</p> | <p>a. The pistil: an individual carpel 1494.
1. The ovary: 1402.
2. The style: 1842.
3. The stigma: 1827.</p> |
| <p>(c) Modification in the forms of flowers:</p> | <p>(1) Apetalous: one set of floral leaves lacking 82.
(2) Naked: both sets of floral leaves lacking 686.
(3) Pistillate: stamen set lacking 686.
(4) Staminate: carpels lacking 686.
(5) Syncarpous: carpels united 1860.
(6) Apocarpous: carpels separated 83.
(7) Sympetalous: petals united 1860.
(8) Polypetalous: many petals 1522.
(9) Actinomorphic: regular petals 9.
(10) Zygomorphic: unlike petals 2138.
(11) Gamosepalous: sepals united 686.
(12) Monodelphous: all filaments united 686.
(13) Perianth: calyx and corolla united 1452.
(14) Epigynous: sepals, petals and stamens above ovary 622.
(15) Hypogamous: sepals, petals and stamens beneath ovary 907.</p> | |

III. PHYSIOLOGY.

General Reference: The activities of plants 1487.

1. **NUTRITION:** processes by which food is obtained and utilized 1366.

a. How plants obtain food:

- (1) **Absorption:** by which materials are taken into the plant body 5.
- (2) **Aeration:** means for taking in and expelling air and dioxid 18.
- (3) **Respiration:** by which energy is set free in the plant 1602.

- (a) Ascent of water through vascular system 2051.
- (b) Transpiration or of water by evaporation 1936.
- (c) Turgor or pressure of water within the cells 1954.

b. How plants utilize their food:

- (1) **Metabolism:** all the chemical processes of the living organism 1210.
- (2) **Digestion:** changing insoluble foods to soluble or soluble to simpler forms 532.
 - (a) Enzymes: or soluble ferments 620.
 - (b) Fermentation: decomposition of substances by living plants 656.
- (3) **Secretion:** substances separated from the protoplasm 123.
- (4) **Assimilation:** changing foods into protoplasm 123.
- (5) **Foods:** materials used in formation and repair of plant-body 690; carbohydrates 332; proteids 1553.
- (6) **Photosynthesis:** the process of making sugar and starch food 1479; chloroplast 393; chlorophyll 393.

c. How plants grow:

- (1) **Growth:** alteration of form, increase in size 808.

2. REPRODUCTION: making new plants 1601.

a. Vegetative propagation: 1552.

- (1) **Gemmæ:** mass of cells producing a new body 742.
- (2) **Runner:** a branch which takes root at the tip 1643.
- (3) **Rootstock:** underground stem sending up shoots 1633; tuber 1943.
- (4) **Grafting:** propagation by a budbearing portion of plant 789.

b. Reproduction by means of spores: 1803.

- (1) **Pollination:** transfer of pollen from stamen to stigma 1518.
- (2) **Conjugation:** union of sexual cells which are alike in appearance 443.
- (3) **Fertilization:** union of unlike cells, sperms and eggs 657.
- (4) **Germination:**
 - 1. Formation of new plants by spores. 760.
 - 2. Formation of plant from seed.

IV. ECOLOGY.

General Reference: the relation of plants to their environment 580.

1. MOVEMENTS IN PLANTS: 1273.

a. **Motor organ:** portion of leaf stalk sensitive to a stimulus 1271.

b. **Irritability:** a condition of protoplasm in which it undergoes a change 943; sensitive plants 1734.

- (1) **The stimulus:** a change in the surroundings.
- (2) **The reaction:** the consequent change in the protoplasm.
- (3) **The death of plants:** a loss of irritability.

- c. Chemotaxis: sensitiveness to a onesided chemical stimulus 376.
- d. Chemotropism: sensitiveness to a onesided chemical stimulus 376.
- e. Geotropism: sensitiveness to the earth's gravitation 755.
- f. Heliotropism: sensitiveness to a change in direction of light 859.
- g. Hydrotropism: sensitiveness to presence of moisture 904.
- h. Phototaxis: sensitiveness to unequal illumination 1479.
- i. Rheotropism: sensitiveness to a direction of current of water 1606.
- j. Thermotropism: sensitiveness to heat coming from one side 1901.
- k. Twining: caused by sensitiveness to contact 1960.

2. MEANS USED FOR POLLINATION:

- a. Amenophilous plants: using the wind for pollination; gymnosperms 818.
- b. Entomophilous plants: using insects for pollination; insects and flowers 930.
 - (1) Self-pollination: pollen transferred to its own stigma 1519.
 - (2) Cross-pollination: pollen transferred to stigma of another flower 1519.

3. RELATION TO FOOD SUPPLY:

- a. Symbiosis: living together of plants 1859.
 - (1) Parasitism: in which the host is injured 1420.
 - (2) Mutualism: in which the host is benefited 1293.
 - (3) Helotism: in which the host is neither benefited nor injured 860.
- b. Saprophytes: which obtain food from decaying bodies and organic products 1678.
- c. Carnivorous plants: which capture insects for food 338.
- d. Epiphytes: getting all food from the air 622.
 - (1) Free floating societies: entirely sustained by water.
 - (2) Pondweed societies: anchored but submerged.
 - (2) Swamp societies: rooted in water but rising above surface.
- e. Hydrophytes: plants living in water 904.
- f. Xerophytes: adapted to dry soil and air 2117.
- g. Halophytes: growing in saline or alkaline soil 828.
- h. Sensitive plants: folding leaves to avoid drought and too intense light 1724.
- i. Geophilous plants: with special structures for preservation 563.

4. DURATION IN PLANTS: 562.

- a. Annual plant: lasting a single season 75.
- b. Biennial plant: foliage one year, stalk the next 210.
- c. Perennial plant: living from year to year 1451.

STUDY OF THE HUMAN BODY

HISTORY OF THE SUBJECT: 212.

Divisions:

- a. Anatomy, which explains the structure of the body 67.
- b. Physiology, which explains the vital activities 1486.
- c. Hygiene, which treats of the preservation of health 905.

I. ANATOMY:

1. THE SKELETON: 1763.

- a. Bone: the hard material of the skeleton 242.
- b. Cartilage: the gristle or soft bone: 806.
- c. Skull: the hard framework of the cranium 1764.
- d. Hand: 833.
 - (1) The carpus or wrist, with 8 bones.
 - (2) The metacarpus or palm, with 5 bones.
 - (3) The digits or fingers, with 14 phalanges.
- e. Foot: 690.
 - (1) The tarsus or ankle.
 - (2) The metatarsus or instep.
 - (3) The phalanges or toes.

2. THE MUSCLES: 1283.

- a. Voluntary or striated: which are controlled by the will.
- b. Involuntary or smooth: not controlled by the will.
- c. Heart muscle: striated and branched.
- d. Belly: the middle part of the muscle.
- e. Tendon: the ends of the muscle.
- f. Origin: the end attached to a fixed bone.
- g. Insertion: the end attached to the moving bone.

3. THE SKIN:

- a. Epidermis: or outer skin composed of cells 1764.
- b. Dermis: the inner and true skin 1764.
- c. Sweat glands: which open through the skin 1764.
- d. Hair: which grows from the epidermis 824.

4. THE NERVES: 1320.

- a. White tissue: which is composed of fibers.
- b. Gray tissue: which is composed of nerve cells.
- c. Sensory nerves: made up of sensitive fibers.
- d. Motor nerves: made up of motor fibers.
- e. Tropic nerves: which regulate nutrition.
- f. Secretory nerves: which stimulate secretion.
- g. Cranial nerves: connected with head, heart, stomach and intestines.

5. THE BLOOD:

- a. Plasma: the fluid part of the blood 1725.
- b. Fibrin: fine threads contained in the plasma 1725.
- c. Serum: the liquid part of the plasma 1725.
- d. Red corpuscles: containing hæmoglobin which holds oxygen 228.
- e. White corpuscles: which can creep and change form 228.
- f. Lymph: which arises from the plasma in the capillaries 1126.
- g. Systemic circulation: blood going through the system 228.
- h. Pulmonary circulation: blood going through the lungs 228.
- i. Portal circulation: blood going through the liver 1102.

6. THE HEART:

- a. Auricles: chambers of the heart that receive blood 853.
- b. Ventricles: chambers of the heart that expel blood 853.
- c. Partition: separating the right and left cavities 853.
- d. Valves: which regulate the flow of the blood in the heart 853.
- e. Arteries: tubes which carry blood away from the heart 113.
- f. Veins: tubes which carry blood toward the heart 853.
- g. Capillaries: which carry blood from veins to arteries 853.
- h. Pulse: distension of arteries by blood pressure 1560.
- i. Valves in veins: to prevent back flow of blood 853.

7. THE LUNGS:

- a. Trachea or windpipe: the air passage through the throat 1603.
- b. Bronchi: the two branches of the windpipe 1603.
- c. Bronchial tubes: small tubes branching through the lungs 1603.
- d. Air sacs: ends of tubes in lungs 1603.

8. THE BRAIN:

- a. Cerebrum: the fore part of the brain 257.
- b. Cerebellum: the hind part of the brain 257.
- c. Medulla Oblongata: between brain and spinal cord 257.

9. THE EYE: 643.

- a. Sclerotic coat: the tough outer coat which forms the cornea.
- b. Choroid coat: the dark middle coat which forms the iris.
- c. Retina: the delicate inner coat, made up of cells, rods and cones.
- d. Vitreous humor: transparent fluid in the main cavity of the eyeball.
- e. Aqueous humor: transparent fluid filling the front cavity of the eyeball.
- f. Crystalline lens: which focuses the light upon the retina.
- g. Optic nerve: which carries sensations to the brain.

10. THE EAR: 572.

- a. Outer ear: the part outside the head and the tube leading inward.
- b. Middle ear: containing the hammer, the anvil and the stirrup.
- c. Inner ear: containing the cochlea and the semicircular canals.
- d. Tympanic membrane: between the outer and middle ear.
- e. Eustachian tube: the air passage from throat to middle ear.

11. THE TONGUE: a muscular organ within the mouth 1922.

12. THE NOSE: the external organ of the sense of smell 1362.

13. THE SALIVARY GLANDS:

- a. Parotid: in front of each ear 1665.
- b. Submaxillary: under the lower jaw 1665.
- c. Sublingual: under the tongue 1665.

14. THE TEETH:

- a. Enamel: the outside of teeth, hardest substance in the human body 1880.
- b. Dentine: a bony substance produced from the dermis 1880.
- c. Pulp: the living substance inside of teeth 1880.

15. THE STOMACH:
1831.

- a. Outer coat: a firm serus membrane.
- b. Muscular coat: with muscular fibers running through it.
- c. Third coat: loosely woven fibrous tissue.
- d. Mucous coat: which contains the mucous glands.
- e. Cardiac glands: those glands near the heart.
- f. Pyloric glands: those glands at the intestines.

16. THE VOCAL CORDS: by which the voice is produced 2026.

17. THE LIVER:

- a. Lobules: with blood and lymph vessels, nerves and bile duct branches running through them. Five sided and composed of cells 1102.
- b. Portal veins: which carry blood through the liver 1102

II. PHYSIOLOGY: 1486.

1. DIGESTION:

- a. Gastric juice: which acts on proteids 1831.
- b. Pancreatic juice: a universal digester 1831.
- c. Pepsin: a ferment contained in the gastric juice 1451.
- d. Enzymes: which digest insoluble foods 620.
- e. Hydrochloric acid: which sets the gastric juice working 1831.
- f. Saliva: a digestive fluid made by the mouth 1665.
- g. Bile: a digestive fluid made by the liver 1102.
- h. Chyme: liquid condition of food when it passes from stomach 1831.
- i. Lymph: a fluid which carries food through walls of capillaries 1126.
- j. Proteids: which are mostly tissue-forming foods 1553.
- k. Carbohydrates: the sugars, starch and cellulose foods 775; 1844; 1811.
- l. Blood: which carries food and water to the tissues of the body 229.
- m. Liver: which performs many offices of digestion 1102.

2. RESPIRATION:

- a. External: which takes place in the lungs 1603.
- b. Internal: which takes place in the tissues of the body 1603.
- c. Air: which supplies oxygen used in respiration 33.
- d. Carbonic acid: the carbon dioxide formed by respiration 332.
- e. Blood: which carries oxygen to the lungs and tissues and carries dioxide away 228.

3. THE SENSES:

- a. Smell: the sense that perceives odors 1768.
- b. Taste: the sense that distinguishes the qualities of foods 1873.
- c. Touch: the sense that distinguishes contact and pressure 1927.
- d. Hearing: the sense by which sounds are distinguished 573.
- e. Sight: the sense that distinguishes the sensations of light 572.

III. HYGIENE:

1. PERSONAL HY- GIENE: 905.

- a. Importance of good habits: 821.
- b. How to overcome injurious habits: 822.
- c. The transmission of likenesses from parent to child: 867.
- d. Importance of cleaning and filling cavities of teeth: 1880.
- e. The advantages of play: 734.
- f. The benefits of physical education: 1480.
- g. The value of gymnastics: 818.
- h. The evil results of alcohol: 42.
- i. Defects of the eye: 644.
- j. Care in the selection of spectacles: 1793.
- k. The necessity of breathing pure air: 2042.
- l. How the air is made impure: 2042.
- m. Why the air is purer in the country than in the city: 34.
- n. Foods and foodstuffs: 689.
- o. Adulteration of foods: 16.

2. PUBLIC HYGIENE: 905.

- a. Heating and ventilation of public buildings: 856.
- b. Warming and ventilation of rooms: 2042.
- c. Vaccination, how and why it is used: 1997.
- d. The discovery of vaccination: 969.
- e. Work done by Louis Pasteur: 1428.
- f. Why milk should be sterilized: 1824.
- g. Captain Cook's cure for scurvy: 905.
- h. The use of antitoxin in disease: 1726.
- i. The work of white corpuscles in fighting disease: 229.
- j. The causes of contagious diseases: 155.
- k. The germ theory of disease: 761.
- l. The work done by bacteria: 1219.
- m. The success of hygiene in preventing disease: 905.

CHEMISTRY

1. THE DEVELOPMENT OF CHEMISTRY AS A SCIENCE: 376.
 - a. The alchemists: 41.
 - b. Contributions to the science: Boyle 225; Priestley 1405; Cavendish 353; Lavoisier 1037; Dalton 498; Davy 509; Thomson 1906; Volta 2029; Faraday 648; Liebig 1066.
2. PHYSICAL AND CHEMICAL CHANGES: 375; 1231.
 - a. Elements: 375.
 - b. Compounds: 375.
 - c. Mixtures: 375.
 - d. Chemical action: 375.
3. FUNDAMENTAL LAWS AND THEORIES:
 - a. Indestructibility of matter: 375.
 - b. Definite proportion: 376.
 - c. Atomic theory: 376.
 - (1) Atoms: 133.
 - (2) Molecules: 1247.
4. OXYGEN:
 - a. Chemical and physical properties: 1405; 53.
 - b. Spontaneous combustion: 1802.
 - c. Ozone: 1406; 53.
5. HYDROGEN: Chemical and physical properties 903.
6. WATER:
 - a. Composition: 2051.
 - b. Mineral waters: 1232.
 - c. Hard waters: 1072.
 - d. As a solvent: 2051.
7. THE ATMOSPHERE: 34.
 - a. Important Constituents: Oxygen 1405; nitrogen 1353; carbon dioxide 333; moisture as dew 526; rain 1582; clouds 412; frost 720; snow 1773.
8. GAS-VOLUME LAWS:
 - a. Change in volume of gas for change in pressure: Boyle's law 255; isothermal 946.
 - b. Change in volume of gas for change in temperature: Charles' law 371; Gay-Lussac 741.
9. ACIDS, BASES AND SALTS:
 - a. Acids 7; alkali 50; salts: 1668.
 - b. Acid, basic, normal and neutral salts: 1668.
 - c. Commercial production of acids, bases and salts: sulphur 1846; acetylene 6; soda 1777; baking powder 159; tartaric acid 1872.
10. COMPOUNDS OF NITROGEN:
 - a. Ammonia: 64.
 - b. Nitric acid: 1352.
 - c. Nitrates: 1353.
11. SULPHUR AND ITS COMPOUNDS: 1846.
12. ELECTROLYTIC DISSOCIATION:
 - a. Electrolytes and ions: 603.
 - b. Laws of chemical equilibrium and mass action: 603.
 - c. Applications of electrolysis: 603.
13. CHLORINE AND ITS COMPOUNDS: 1667.
 - a. Hydrochloric acid: 392.
 - b. Aqua regia: 353.
 - c. Bleaching: 226.
14. CARBON: 332; 599.
 - a. The allotropic forms of carbon: allotropy 53; graphite 795; coal 414; lampblack 1024; peat 1436.
 - b. Properties of charcoal: 367.
 - c. The oxides of carbon: 333; lime 1071.
 - d. Hydrocarbons: carbon 332; acetylene 6.
 - e. Illuminating gas: 739; natural gas 1306; coke 420; bitumen 221; asphalt 121.
15. THE CHEMISTRY OF FOODS: 689.
 - a. Proteids: 1553; nitrogen compounds 1353; 41.
 - b. Carbohydrates: 332; starch 1811; sugars 1844; cellulose 357; photosynthesis 1479; glucose 775.
 - c. Fats: 689; oils 1376.

16. FERMENTATION: { a. Decay and spoiling of foods: 656; carbon 333.
b. Sterilizing and pasteurizing methods: 1824; 1428.
c. Production of alcohol: 42; vinegar 2022; fermentation 656.
17. PHOSPHORUS GROUP OF ELEMENTS: 1475; 53. { a. Phosphates: 1475.
b. Matches: 1118.
c. Fertilizers: 657.
d. Antimony and bismuth: 80; 220; 1512.
18. THE ALKALI METALS: { a. Compounds of sodium: 1777; salt 1667; borax 246; glass 772; tartaric acid 1872; saltpeter 1667.
b. Baking powders: 159.
c. Soaps: 1774.
d. Gunpowder: 815.
e. Spectroscope and flame tests for metals: 1793; plucker tube 1506.
19. THE ALKALINE—EARTH METALS: { a. Calcium: 305.
b. Marble and lime: 1167; 1071; gypsum 819; Drummond light 555.
c. Calcium carbide: 305; acetylene 6.
d. Mortar and cements: 357; gypsum 819.
20. METALLURGY OF IRON: 1211. { a. Cast iron, wrought iron and steel: 939; 1819; furnace 725; ore-dressing 1235.
b. The Bessemer process: 207; Kelly 995.
c. The open-hearth process: 1820; rolling-mills 1625; foundry 702; flux 687.
d. Crucible steel: 1820.
e. Annealing: 75.
21. COPPER: 452. { a. Metallurgy: 1211.
b. Electrolytic purification: Electrolysis 603; metallurgy 1211.
22. ORGANIC CHEMISTRY: 375. { a. Hydrocarbons: carbon 332; hydrogen 903; petroleum 1462.
b. Alcohols: 42.
c. Acids: 7.
d. Aniline dyes: 73.

PEDAGOGICS

1. THE TERM IN ITS LARGER SENSE, CONSIDERING EDUCATION AS AN ASPECT OF LIFE IN GENERAL.
 - a. As related to environment: 1437.
 - (1) Environment of the age in which one lives.
 - (2) Environment of one's country and community.
 - b. The individual factors: 1437.
2. PEDAGOGICS IN THE RESTRICTED SENSE AS RELATED TO THE WORK OF THE SCHOOL:
 - a. Development of the activities of the child: function of the school: 1437.
 - b. Function of the teacher: 1438.
 - c. Nature of education: 1438.
 - d. Nature of the act of learning: 1438.
 - (1) By observation.
 - (2) By experimentation.
 - (3) By reasoning.
 - e. Teaching the art of stimulating and guiding the self-activity of the child: 1438-9.

THE DIVISIONS OF THE SUBJECT:

- a. History of Education.
- b. Philosophy of Education.
- c. School Organization and Management.
- d. Methodology.

HISTORY OF EDUCATION:

1. VALUE OF THE STUDY OF HISTORY OF EDUCATION: 584.
2. FIVE EPOCHS IN EDUCATIONAL HISTORY: 584.
3. EDUCATION MIDDLE AGES: 1695.
4. INFLUENCE OF THE REFORMATION: 1695.
5. INTRODUCTION OF POPULAR SYSTEMS IN GERMANY, HOLLAND, SCOTLAND, FRANCE, ENGLAND AND UNITED STATES: 1695.
6. AIMED AT RELIGIOUS ENDS: 1695.
7. RADICAL DEPARTURE OF MODERN EDUCATION FROM OLD IDEALS.
 - a. In respect to aim: 584.
 - (1) Progressive ideals.
 - (2) Social efficiency.
 - (3) Vocational training.
 - (4) Extension to all classes.
 - b. In respect to subject matter: 584.
 - (1) Enlargement of curriculum.
 - (2) Development in elementary schools.
 - (3) Technical and vocational studies.
 - c. In method: 585.
 - (1) Psychology as bearing upon method.
 - (2) Mechanical memory-work displaced.
 - (3) Inductive method.
 - (4) Appeal to powers, instincts and interests of pupil.
 - (5) Correlation of studies: 460.
 - d. In organization: 585.
 - (1) State systems in place of religious or private control.
 - (2) Development of public school system under state supervision and support.
 - (3) Large funds for educational purposes.
 - (4) Professional training for teachers.

e. Elementary Schools: 1695-96.

- (1) Rise of popular education.
- (2) Influence of Pestalozzi.
- (3) Expansion of curriculum.
- (4) Systems in Germany, France and England.
- (5) Elementary education in the United States.
- (6) Work of Horace Mann.
- (7) Development of the system.

f. Secondary Schools: 1701-02.

- (1) Origin and aim.
- (2) Present system in Germany, France and England.
- (3) In the United States.

g. Academies: 1702.

- (1) Time when they came in.
- (2) A result of what movement.
- (3) How they in large measure took the place of the grammar schools.
- (4) How they differed from grammar schools in purposes.
- (5) Academies as finishing schools and as schools for the training of teachers.
- (6) Introduction of new subjects of study.
- (7) Prominence of science in the academies.

h. High Schools: 1702.

- (1) A development of the academies.
- (2) The first in the United States.
 - (a) The English High School of Boston: 1702.
- (3) How they differed from academies.
- (4) Their public character.
- (5) High Schools as a product of the idea that secondary education should be supported and controlled by the public.
- (6) Their spread over the United States.
- (7) Their number at present.

i. University Education: 1886.

- (1) Origin and organization of the modern university: 1886.
- (2) History of universities of Europe: 1887.
- (3) The first American Universities:
 - (a) Harvard: 1888.
 - 1 The time of its foundation.
 - 2 How it received its name.
 - (b) William and Mary College: 2088.
 - 1 Time of its foundation.
 - 2 Men trained here in the Colonial period.
 - (c) Yale: 2120.
 - 1 How it received its name.
 - 2 Time and occasion of its establishment.
- (4) Establishment of the State Universities: 1888.
 - (a) Period of establishment.
 - (b) Government aid in establishing.
 - (c) First state universities.
 - (d) The University Extension movement.
 (See Index under University).

j. Rural Schools: 1697.

- (1) Character and scope in the United States.
- (2) Course of Study.
- (3) Organization and government.
- (4) Support: 1698.
- (5) Teachers: 1698.
- (6) Buildings: 1699.
- (7) Improvement of Rural Schools: 1699.
- (8) Consolidation of Schools and transportation of pupils: 1700.
- (9) Conventions of School-officers: 1700.

- (10) Rural High Schools: 1700.
- (11) Educational Extension: 1701.
- (12) Bibliography: 1701.
- k. Summer Schools: 1702.**
 - (1) Chautauqua type.
 - (2) Summer-session of Universities, etc.
 - (3) Credit toward degree for work done.
 - (4) Training of teachers.
- l. Schools for Defectives: 1703.**
 - (1) Methods for teaching the deaf:
 - (a) Sign language.
 - (b) Manual alphabet.
 - (c) Direct or oral method.
 - (2) Methods for the blind:
 - (a) Raised letters.
 - (b) Braille system.
 - (3) Methods for feeble-minded:
 - (a) Industrial and kindergarten training.
- m. Schools of Commerce: 1703.**
 - (1) Private commercial schools: 1704.
 - (2) Public High Schools: 1704.
 - (3) Commercial Schools in Europe: 1703.
 - (4) Commercial courses in American Colleges and Universities: 1704.
- n. Vacation Schools: 1997.**
 - (1) An extension of public school system.
 - (2) How conducted.
 - (3) Study and recreation combined.
 - (4) Beneficial results.
- o. Industrial Schools: 924.**
 - (1) A substitute for apprenticeship.
 - (2) Advantages over apprenticeship.
 - (3) German system.
 - (4) Industrial training in public schools.
 - (5) Schools of industrial design.
 - (6) First public industrial school in U. S.
- p. Continuation of Schools: 448.**
 - (1) Object of continuation work.
 - (2) Vocational training.
 - (3) Work of Y. M. C. A.
 - (4) Continuation schools in Germany, France and other countries.
- q. Excursion Schools: 640-41.**
 - (1) Nature-study excursions.
 - (2) Out-door geography work.
 - (3) Historical work.
 - (4) Visits to public institutions.
 - (5) Excursion Schools in Germany.
 - (6) Difficulties and advantages in excursion work.
- r. Technical Schools: 1879.**
- s. Trade Schools: 1931.**
 - (1) Nature and object of trade-schools.
 - (2) When and where first founded.
 - (3) Courses of instruction.
 - (4) Privately endowed.
 - (5) Names of principal trade-schools.
- t. Kindergarten: 1002-03.**
 - (1) Outgrowth of great reform movement by Froebel.
 - (2) Underlying principles.
 - (3) Methods based on child-nature.
 - (4) Results based on reports of teachers.
 - (5) Thorough training of teachers essential.
 - (6) First establishment and wide growth of kindergartens.

- u. **The School Garden:** 1690-91.
 - (1) Outgrowth of school-work.
 - (2) Relation to nature-study.
 - (3) Relation to geography.
 - (4) Relation to esthetics.
 - (5) Relation to the home.
 - (6) Educative effect on pupils.
 - (7) Value to teachers.
 - (8) School gardens in Europe.
 - (9) Relation to manual training.
- v. **Correspondence Schools:** 461.
- w. **American Colleges:** 422-23.
 - (1) Courses of Study.
 - (2) Conditions of admission.
 - (3) Elective studies.
 - (4) Founded to train ministers.
 - (5) Aim greatly broadened.
 - (6) College Fraternities.
 - (7) Athletics.
 - (8) Attendance, instructors and endowments.
 - (9) College entrance-examination board.
- x. **Going to College:** 423-24.
 - (1) Who should go.
 - (2) Value of college course.
 - (3) Result as related to practical life.
 - (4) Selection of college.
 - (5) Universities as compared with small colleges.

II. PHILOSOPHY OF EDUCATION:

1. PSYCHOLOGY FOR TEACHERS:

- a. Its place in the new education: 1557.
- b. Development by Herbart: 1557.
- c. Influence in modifying the method of teachers: 1557.
- d. Inductive method: 1557.
- e. Analytic method instead of synthetic; word method in teaching reading: 1558.
- f. Laws of memorizing and habit: 1558.
- g. Physiological psychology: 1558.

2. APPERCEPTION:

- a. Views of Leibniz, Kant, Herbart: 88.
- b. Interpreting of perceptions by the mind: 84.
- c. Consequences of this principle on education: 84.
- d. How it affects the work of the teacher: 84.
- e. Importance as related to course of study: 84.
- f. Relation of apperception to interest: 85.

3. ASSOCIATION OF IDEAS:

- a. Meaning of the term: 123.
- b. Views of Locke and Hartley: 124.
- c. James statement of the laws of association: 124.
- d. Conditions affecting the law of association: 125.

4. FEELING:

- a. Use of the term subjective: 652.
- b. Relation between feeling and cognition: 652.
- c. Conditions of feeling: 652.
- d. Function of the emotions: 653.
- e. Organic and external expressions of emotions: 653.

5. INTEREST:

- a. Explanation of the use of the term: 931.
- b. Discipline as an educational factor: 931.
- c. Opposing view of Rousseau: 931.
- d. Theory of Herbart: 931.

- e. Influence of Rousseau, Herbart and Froebel on modern education: 332.

6. CHILD STUDY:

- a. Study of mental and physical nature of children in modern education: 334.
- b. Work of Rousseau, Pestalozzi, Herbart and Froebel: 334.
- c. Culture-epoch theory of Ziller: 334.
- d. Theory of G. Stanley Hall: 335.
- e. Preyer's "The soul of the child": 335.
- f. Learning by doing: theories of Dewey and Angell: 335.
- g. Development of perception: 335.
- h. Place of play in education: 335.

7. ADOLESCENCE:

- a. Transition from childhood to adult life: 14.
- b. Physical changes characteristic of this period: 14.
- c. Mental and emotional traits: 15.
- d. Late adolescence period of change from dependence to independence: 15.
- e. Called the stress and strain period: 15.
- f. Professor James' advice: 15.
- g. Practical problem of the educator: 15.

8. SELF ACTIVITY:

- a. Instincts, impulses and interests: 1720.
- b. Emphasized by Froebel school: 1720.
- c. Relation of the will: 1720.
- d. Self activity basis of the will, effort and interest: 1720.
- e. How developed: 1720.
- f. How to be treated by teacher: 1720.

9. HABIT:

- a. Definition of term: 821.
- b. How distinguished from instinct: 821.
- c. How habits are established: 821.
- d. Relation to brain and nerve action: 821.
- e. Function and value of habit: 821.

10. MENTAL DISCIPLINE:

- a. Value in developing power of mind: 1203.
- b. Disciplinary value of certain studies: 1204.
- c. Opposing views of Herbart: 1204.
- d. Discipline a factor in choosing school curriculum: 1204.
- e. Value of correlation: 1205.

11. MEMORIZING:

- a. Place in early system of education: 1201.
- b. Change of method in modern education, but aim the same: 1201.
- c. Memory differs in degree and kind: 1201.
- d. Methods of memorizing mechanical and associative: 1201.
- e. Mnemonic systems: 1201.
- f. Logical associations most effective: 1201.

III. SCHOOL ORGANIZATION AND MANAGEMENT:

1. WHAT THE SUBJECT INCLUDES: 1691.

2. MATTERS CONCERNING THE SCHOOL BUILDING:

- a. The erection of the school building: 1699.
 - (1) Selection of the proper site.
 - (2) Aid to be obtained from the state in designing
- b. School sanitation: 1691-92.
 - (1) What is included in the subject: 1691.
 - (2) Heating and ventilation: 1692.
 - (3) Problem of providing for sufficient light: 1692.
 - (4) Need of having adjustable seats and desks: 1692.

3. ORGANIZATION AND CONDUCT OF THE SCHOOL:

- a. The course of study:
 - (1) Correlation of the course of study: 460.
 - (a) What is meant by correlation: 460.
 - (b) The views of Herbart, Froebel and Dewey: 460.
 - (c) Subjects which may most easily be correlated: 461.
- b. Discipline and punishment:
 - (1) Theory of punishment in general: 1562.
 - (2) The proper aim in punishment in school: 1563.
 - (3) Partial solution of the problem:
 - (a) In activity and interest of children in the school: 1563.
 - (b) In self-government: 1563.

4. THE SCHOOL GARDEN: 1504, 1690.

- a. Relation of the school garden to regular school study: 1690.
- b. Values to be realized by use of garden: 1691.
- c. Relation of the garden to the home of the children: 1691.
- d. Manual training in the care of the school garden: 1691.
- e. The garden in the teaching of nature study: 1690.

5. PROBLEMS OF SPECIAL TYPES OF SCHOOLS:

- a. Rural Schools: 1697.
- b. Summer Schools: 1702.
- c. Schools for Defectives: 1703.

IV. METHODOLOGY.

1. METHOD IN THE TEACHING OF ARITHMETIC:

- a. The Subject-Matter of Arithmetic:
 - (1) The essential subjects to be taught in arithmetic: 97.
 - (2) Why it is advisable to drop certain subjects commonly taught: 97.
 - (3) The test of a good topic: 98.
 - (4) What some of the new valuable subjects are: 98.
 - (5) The change in recent text-books: 98.
- b. The right aim in teaching arithmetic: 98.
- c. The significance of the answer to a problem:
 - (1) How far the answer should be emphasized: 98.
- d. Value of interest in a problem:
 - (1) The effect of interest on concentration of attention: 98, 932.
- e. Arithmetic teaching in the first two grades:
 - (1) Informality of the subject in the first year: 98.
 - (a) Reasons for this: 98.
 - (2) How counting should be taught and utilized: 98.
 - (3) Measuring and what it should involve in the first two years: 98.
 - (4) Teaching of fractions:
 - (a) Why teach them early: 98.
 - (b) Devices to make the steps clear: 98.
 - (5) Method in subtraction: 98.
- f. Arithmetic in the third, fourth, and fifth grades:
 - (1) Reduction, ascending and descending: 99.
 - (a) To what this should be confined: 99.
 - (2) Decimal fractions: 99.
 - (a) When decimal fractions should be taught: 98.
 - (b) The best methods of teaching multiplication and division of decimals: 99.
- g. Arithmetic in the sixth and seventh grades.
 - (1) Where the main value in the arithmetic work here lies: 99.
 - (2) Importance of correlation: 99.
 - (3) How to teach percentage: 99.
 - (4) Use of equation in arithmetic: 99.
 - (5) Place and value of oral work: 99.
 - (6) How to emphasize the thought side of a problem: 99.
 - (7) Confusion arising from home help: 100.

2. METHOD IN THE TEACHING OF GEOGRAPHY:

- a. The scope of the subject of geography:
 - (1) Definition: 745.
 - (2) How geography differs from physiography: 746, 1482.
- b. Geography, how divided:
 - (1) Physical geography: 745.
 - (2) Political geography: 745.
 - (3) Commercial geography: 745.
 - (4) Medical geography: 745.
 - (5) Oceanography: 745.
- c. Geography, its relation to the sciences:
 - (1) Geology: 747.
 - (2) History: 747.
 - (3) Astronomy: 127.
- d. Geography in the first three grades:
 - (1) The aim here: 746.
 - (2) Geography as incidental to the study of primitive life and nature study: 746, 1308.
- e. Geography in the third and following grades:
 - (1) Geography as a separate subject here: 746.
 - (2) Home geography as the first study taken up; nature study in this: 746, 1308.
 - (3) Importance of emphasis on the causal idea: 746.
 - (4) How the new geography differs from the old: 746.
 - (5) Dynamic character of geography when properly taught: 746.
 - (6) Aids in geography teaching:
 - (a) The magnet: 1145; compass, 435; barometer, 174; dial, 526; thermometer, 1900.
 - (7) The necessity of laboratory and field work: 746.
 - (8) Sources of information: 746.

Note: Refer to Outline on Geography.

3. METHOD IN THE TEACHING OF HISTORY:

- a. The values of history to be realized: 876.
 - (1) Main value lies in helping people to understand the present.
 - (2) Instruction which history furnishes in way of human life and character.
 - (3) Furnishing of ideals of conduct.
- b. Why the history of one's own country is most valuable: 876.
- c. Beginning of history work in the third grade: 876.
 - (1) Use of history stories here.
 - (2) Value of skillful story telling.
- d. Use of American history as the subject for elementary history: 876.
 - (1) The divisions of the subject into periods for purposes of teaching.
 - (a) Period of exploration on sea and land.
 - (b) Period of settlement and colonial development to 1763.
 - (c) The struggle with England, the war for independence, the adoption of the Constitution.
 - (d) The growth of the country under the constitution.
- e. How to make the history work most valuable: 876.
 - (1) Select the more interesting and striking phases.
 - (2) Make use of biography to a great extent.
 - (3) Supply by reference books or otherwise, material on customs of the people.
 - (4) Use source materials.
 - (5) Do not make use of long chronological tables.
 - (6) Use charts to get view of contemporary history and historical order: See History Charts: 877.
 - (7) Use population maps and other devices.
 - (8) In upper grades encourage independent study.

Note: Refer to Outline on History.

4. METHOD IN THE TEACHING OF LANGUAGE:

- a. What is included in language work in school: 1026.
 - (1) The broad meaning.
 - (2) The narrower meaning.

- b. The two general problems in language teaching: 1026.
 - (1) To extend child's power to use language.
 - (2) To correct his language errors.
- c. Experience at base of all language work:
 - (1) Varieties of experience to be worked with: 1026.
 - (2) What good language work does for child experience: 1026-7.
- d. Method in oral and written language: 1027.
 - (1) Means suggested to assist written work.
 - (2) How the teacher may improve the oral English of pupils:
 - (a) Encourage children to speak freely on interesting subjects.
 - (b) Incidental suggestions correcting mistakes when made.
 - (c) Get pupils to give conscious attention to forms of speech.
 - (3) Formal correction of language errors in upper grades: 1027.
 - (a) Steps in formal correction:
 - 1. Errors recognized.
 - 2. Correct form determined by means of grammar.
 - 3. Correct form made habitual by drill.
- e. Grammar:
 - (1) Formal grammar not so important as formerly: 1027, 790.
 - (2) Dependence for correct English on correct use without many rules: 1027.
 - (3) Lack of formal grammar in first six years of school: 1027, 790.
 - (4) Grammar in the seventh and eighth grades: 1027, 791.
 - (a) Pupils usage made the basis for inductive study: 1027, 791.
 - (b) Mainly a matter of classification essential to guidance of oral and written expression: 1027.
 - (c) Language treated as an art, not a science: 1027.
- f. Foreign languages: 1027, 791.
 - (1) Oral work: 1028.
 - (2) Written composition: 1028.

5. METHOD IN THE TEACHING OF MANUAL TRAINING:

- a. What manual training in the wide sense includes: 1162.
 - (1) Shop and desk work.
 - (2) Domestic science.
 - (3) Domestic art.
- b. Value in manual training:
 - (1) Giving of useful skill and knowledge: 1163.
 - (a) Commercial value of manual dexterity.
 - (2) Development of motor control: 1163.
 - (3) Development of observation and judgment: 1163.
 - (4) Values on artistic side: 1163.
 - (5) Object of stick laying, paper folding, tracing, clay modelling and weaving: 1164.
- c. Desk and shop work:
 - (1) Desk work in early grades: 1163.
 - (a) Use of ordinary desks: 1165.
 - (b) Working outline lessons for 23 weeks: 1164.
 - (c) Basketry: 179.
 - (d) Drawing: 551.
 - (2) Shop work in upper grades:
 - (a) Materials used: 1165.
 - (b) Tools required: 1163, 1165.
- d. Domestic Art: 542.
 - (1) What is included in domestic art.
 - (2) Special values in the subject.
 - (3) The development of taste and skill.
- e. Domestic Science:
 - (1) Branches taught: 542.

- (2) Where the emphasis is laid in teaching domestic science: 542.
- (3) Domestic science in the upper grades: 542.

- f. Industrial schools in relation to manual training: 924.

6. METHOD IN THE TEACHING OF MUSIC:

- a. The primary purpose of music teaching in school: 1286.
- b. Means of accomplishing the purpose: 1286.
 - (1) Experience: imitative singing.
 - (2) Classification of ideas and application of musical ideas: sight singing.
 - (3) Use of concrete ideas in musical composition.
 - (4) Use of musical instruments.
- c. Method in the first phase of music teaching.
 - (1) Accurate imitation of what is heard and holding it in memory: 1286.
 - (2) Classification of ideas: 1287.
 - (a) Ideas dealing with interpretation of music.
 - (b) Ideas dealing with structure.
 - (c) What is taught under each.
 - (3) The main difficulty in forming general musical ideas: 1287.
 - (4) Importance of doing what is observed: 1287.
 - (5) How to clarify ideas obtained.
 - (a) Various devices.
- d. Method in the second and third phases.
 - (1) How the process in the second phase is the reverse of that in the first: 1287.
 - (2) The development of ability to conceive of and reproduce motives: 1288.
 - (a) Value of instrumental music here.
 - (b) Need of careful guidance of pupils.
 - (c) Use of pianola and similar instruments.
- e. General assemblies and festivals in teaching of music. (See article on The School-Song, 1692.)
 - (1) Occasions for festivals.
 - (2) Festivals as furnishing motives for music work.
 - (3) Combination of music and the drama in the festival.
- f. Musical Notation: 1288.
 - (a) Art of representing tones by printed characters.
 - (1) Structural Ideas:
 - (a) Pulse-grouping: 1289.
 - (b) Tone-duration: 1289.
 - (c) Pitch-representation: 1290.
 - (d) Key-signature: 1290.
 - (e) How indicated in written music: 1290.
- g. Harmony.
 - (1) Chord: 838.
 - (2) Tonality: 839.
 - (3) Melody: 840.
 - (4) Key: 840.
 - (5) Scale: 840.
- h. Form in Music.
 - (1) Mode of expression: 694.
 - (a) Vocal and instrumental.
 - (b) Choral and orchestral.
 - (2) Function: 694.
 - (a) Secular.
 - (b) Ecclesiastical.
 - (c) Religious.
 - (3) Character: 694.
 - (a) Lyric.
 - (b) Dramatic.
 - (c) Programmatic.
 - (4) Structural ordering: 694.

- (5) Melodic material: 694.
- (6) Illustrative examples: 695, 696.

i. Religious Music: 1284.

- (1) Essential characteristics: 1285.
- (2) Importance of association: 1285.
- (3) Why secular music is inappropriate for religious use: 1286.
- (4) Type of effective religious music: 1286.
 - (a) Long used for religious purposes.
 - (b) Employing form not adapted to secular use.
 - (c) Effective musically.

j. School Song:

- (1) Importance of careful selection: 1692.
- (2) Imitative and dramatic period: 1692.
 - (a) Model selections, with suggestions for teaching: 1693.
 - (b) First step: 1693.
 - (c) Advanced step: 1693.
 - (d) Teaching points to gain expressive use of song: 1693.
- (3) Investigative period: 1694.
 - (a) First step; use of descriptive songs.
 - (b) Illustrations.
 - (c) Advanced step; songs to promote sight-singing.
 - (d) Illustrations.
- (4) Constructive period: 1694.
 - (a) Work in upper grades.
 - (b) First step.
 - (c) Advanced step.
 - (d) Illustration.
- (5) Work in High School: 1695.
 - (a) Difficulties and how to meet them; chorus work.
 - (b) Appropriate selections.
- (6) General assemblies and festivals: 1695.
 - (a) Festivals.
 - (b) Suggestions for this class of work.

k. Musical Tones: 8.

- (1) The musical scale: 9.

7. METHOD IN THE TEACHING OF NATURE STUDY:

a. Nature Study as a school subject: 1307.

- (1) What nature study includes.
(See outline on Nature Study in "The Student's Manual.")
- (2) Basis of nature study in interests and activities of children.
- (3) Importance of nature study in early school years.
- (4) Relation of nature study to school science.
 - (a) Function of nature study as an introduction to science.
 - (b) How nature study gradually differentiates in the upper grades and high school into geography, botany, physics, etc.: 1308.

b. Purposes in teaching the subject: 1308.

- (1) Development of perceptive faculties, observation, understanding, memory, judgment and language.
- (2) Development of genuine love of nature.
- (3) Extend the child's range of experience.

c. The material to be used: 1308.

- (1) Principles involved in selection.
- (2) Materials for study in early grades according to season of the year.

d. The key to method: 1309.

- (1) Emphasis on function.
- (2) Continual use of problems both in beginning and continuing study.

e. Utilization of vacation experiences of children: 1308.

- (1) Subjects for study and discussion.

- (2) Material collected during summer.
 - (a) The school museum.
 - f. Nature Study Excursions: 640-41.
 - (1) Main purposes:
 - (a) To bring into contact with outside world.
 - (b) To give direct experience.
 - (c) To give reality to study.
 - (d) To make work more objective and concrete.
 - (2) Necessity of seeing objects in their natural situations.
 - (3) Interest in work given by excursions.
 - (4) How the advantages outweigh the disadvantages.
 - g. The camera in nature study: 1309.
 - (1) Value of camera in excursions.
 - (2) What the camera can do in nature study.
 - (3) The kind of training which use of camera gives.
 - (4) The camera as a source of material for study.
 - h. The school garden in nature study: 1690.
8. METHOD IN THE TEACHING OF PENMANSHIP:
- a. The three typical systems of handwriting: 1445.
 - (1) The slant, the medial, and the vertical.
 - b. Main requirements in teaching penmanship: 1445.
 - (1) Legibility.
 - (2) Speed.
 - (a) Less demand for this than formerly.
 - (3) Ease.
 - (4) Individuality.
 - c. The first years of penmanship work: 1445.
 - (1) Little or no penmanship in the first year of school.
 - (2) The first work.
 - (a) Use of the blackboard.
 - (b) Seat work with pencil.
 - (c) Necessity of practice.
 - (d) Use of dictation exercises.
 - (e) The method emphasizing accuracy at first.
 - (f) Method emphasizing form first with accuracy to follow.
 - (3) After the first, personal variations from the model allowable.
 - d. Penmanship made a special subject after the sixth grade: 1446.
 - e. The important considerations in the seventh and eighth grades: 1446.
 - f. Individual work in correction: 1446.
9. METHOD IN PHYSICAL EDUCATION.
- a. What physical education includes: 1480.
 - (1) The more general meaning:
 - (a) Physical examination of pupils and students.
 - (b) Personal direction in matters of health.
 - (c) Class instruction in hygiene.
 - (d) Gymnastics and athletics.
 - (2) The more technical meaning.
 - b. Increased importance of physical education: 1481.
 - (1) Requirements of healthful and successful living.
 - (2) Lack of physical exercise and training in modern conditions of living.
 - c. Physical education as a means of insuring normal development: 1481.
 - (1) The furnishing of opportunity.
 - (2) By furnishing incentive.
 - d. Means of physical education.
 - (1) Plays, dances, and games: 734-35.
 - (See the psychology of play under "Child-Study," p. 385.)
 - (a) Importance of these compared with gymnastics: 817, 1841.

- (b) Elements and opportunities for these supplied by school subjects.
- (2) Athletics: 131.
- (3) Gymnastics: 817.
 - (a) How formal gymnastics lack in educational values: 1841.
 - (b) Proper use of gymnastics as corrective: 817.
- e. The program in physical culture:
 - (1) The kindergarten and first years of elementary school: 1481, 1003.
 - (a) Character of exercises.
 - (b) No activities requiring fine adjustments.
 - (c) Place of marching and drill, climbing, swinging movements, games of skill.
 - (2) Grammar grades: 1481.
 - (a) Prominence of games and exercises requiring skill.
 - (b) Group games.
 - (3) Physical education in early adolescence: 1481.
 - (a) Consideration of individual weaknesses.
 - (b) Emphasis on use of apparatus.

10 METHOD IN THE TEACHING OF READING:

- a. Divisions according to aspects emphasized: 1590.
 - (1) Beginning reading.
 - (2) Thought-reading.
 - (3) Appreciative reading.
- b. Beginning Reading: 1590.
 - (1) What is involved in mastering mechanics of reading:
 - (a) The new and strange printed forms.
 - (b) Oral words.
 - (c) Experiences already within his command.
 - (2) The main effort of the teacher in beginning reading.
 - (3) The two general methods of approach.
 - (a) The thought-method.
 - 1. What is involved.
 - 2. The main reliance in this method.
 - (b) Phonetic method:
 - 1. Emphasis on pronunciation units which make up words.
 - 2. The theory at the base of this method.
 - 3. Artificial character of phonetic methods.
 - 4. The main phonetic methods.
 - (c) Combination of the phonogram method and the thought-method is the best.
 - (d) The final aim.
- c. Thought Reading: 1591.
 - (1) To what the term is applied.
 - (2) Purpose in thought reading.
- d. Appreciative Reading: 1591.
 - (1) Meaning of "appreciative reading."
 - (2) Purpose.
- e. Special reading methods in school and special purpose of each: 1591.
 - (1) Oral reading.
 - (2) Silent reading.
 - (3) Individual reading.
 - (4) Concert reading.
 - (5) Prepared reading.
 - (6) Sight reading.
 - (7) Intensive reading.
 - (8) Extensive reading.
 - (9) Supplementary reading.

AGRICULTURE

The study of Agriculture holds a place of large and growing importance, both in our schools and in the work of the successful farmer of today. This outline shows the abundant material contained in THE NEW STUDENT'S REFERENCE WORK, in aid of this study. For the convenience of those who wish further information in any special line, reference is given to Farmers' Bulletins, issued by the government. These Bulletins are sent free to any one who applies for them. Address, Secretary of Agriculture, Washington, D. C.

1. STUDY OF THE SOIL:

- a. Clay soil: in which the earth particles are very small and hold together 1778; 406.
- b. Sandy soil: in which the particles are larger and loosely held together 1673.
- c. Loam: a mixture of sand and clay 1778.
- d. Alluvium: soil formed by rivers, bottom land 53.
- e. Humus: decayed organic matter in the soil 898; 1165.
- f. Earthworms: how they make humus in the soil 575.
- g. Mulch: a loose top dressing to prevent loss of moisture 331; 1275.
- h. Capillarity in soils: rising of water through the soil particles 330.
- i. Subsoil: uncultivated soil below the upper layer 1842.
- j. Dry farming: method of farming with little rainfall 942.
- k. Transpiration: amount of water needed by plants 1936.

Consult:

Farmers' Bulletin No. 257 Soil Fertility.
Farmers' Bulletin No. 266 Management of Soils to Conserve Moisture.
Farmers' Bulletin No. 245 Renovating Wornout Soils.
Farmers' Bulletin No. 150 Clearing New Land.

2. FERTILIZING THE SOIL:

- a. Nitrogen: plant food consumed mostly in growing 1353.
- b. Phosphate: plant food consumed mostly in fruiting 1475.
- c. Potash: plant food consumed mostly in seeding and maturing 1537; Ammonia 64; Saltpeter 1667.
- d. Lime: used for correcting the acidity of soils 1071; 658; Marl 1173.
- e. Manure: used for getting plant food and humus into the soil 1165.
- f. Fertilizers: plant foods artificially and commercially prepared 657.
- g. Benefit of live stock on the farm: 1828.
- h. Compost and green manures: Cowpeas 470; Pea 1432; Alfalfa 46; Rice 1610.
- i. Nitrogen gathering crops: 1353; Bacteria 154.
- j. Root tubercles or leguminous plants: 1633.
- k. Absorption: why plant food should be soluble in water 5.
- l. Rotation of crops: benefits of rotation 1636.

Consult:

Farmers' Bulletin No. 44 Commercial Fertilizers.
Farmers' Bulletin No. 192 Barnyard Manure.
Farmers' Bulletin No. 278 Leguminous Crops for Green Manuring.
Farmers' Bulletin No. 48 The Manuring of Cotton.
Farmers' Bulletin No. 77 Liming of Soils.
Farmers' Bulletin No. 88 Alkali Land.

Plan for Finding What Plant Food Element is Lacking in the Soil.

Lay off 9 plats in a field, 2 rods by 8 rods. Apply a different fertilizer to each plat. Plant corn in each one, and compare the growth and yield of the plats. A more liberal application of fertilizers is used in making this test than would be recommended for general fertilizing.

A chemical analysis of a soil will give valuable information of a general nature regarding the soil; but it cannot be relied upon to determine just what fertilizers should be used. The only way to find out what fertilizers to use on a particular piece of ground is by actual experiment.

2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	2 rods	
8 rods	Potash 8 lbs.	Acid Phosphate 25 lbs.	Nitrogen 20 lbs.	No Fertilizer	Potash 8 lbs. Acid Phos. 25 lbs.	Potash 8 lbs. Nitrate 20 lbs.	Acid Phos. 25 lbs. Nitrate 20 lbs.	Nitrogen Phos. Acid and Nitrogen	Lime	8 rods

3. DRAINAGE AND IRRIGATION:

- a. Tile and ditch drainage: 549.
- b. Water-table in the soil and how it affects crops: 549.
- c. The reclamation of swamp lands: 1592.
- d. Tile drainage of irrigated land: 942.

Consult:

Farmers' Bulletin No. 263 Practical Information for Beginners in Irrigation.
Farmers' Bulletin No. 187 Drainage of Farm Lands.
Farmers' Bulletin No. 158 How to Build Small Irrigation Ditches.
Farmers' Bulletin No. 371 Drainage of Irrigated Lands.
Farmers' Bulletin No. 138 Irrigation in Field and Garden.

4. SEEDS AND SEED SELECTION:

- a. Seeds: names of different parts of a seed 1718.
- b. Seed dispersal: how seeds are scattered 1717.
- c. Spores: the reproductive cells of seedless plants 1803.
- d. Germination of seeds: escape of the young plant from its seed case 760.
- e. Embryo: the young plantlet within the seed 611.
- f. Endosperm: the food in the seed used by the young plant 614.
- g. Seed selection: advantages of practicing seed selection; 31.

Consult:

Farmers' Bulletin No. 306 Dodder in Relation to Farm Seeds.
Farmers' Bulletin No. 253 The Germination of Seed Corn. (Test for Germination.)

5. VARIOUS FIELD AND GARDEN CROPS:

- a. Corn: 457.

Consult:

Farmers' Bulletin No. 199 Corn Growing.
Farmers' Bulletin No. 229 The Production of Good Seed Corn.
Farmers' Bulletin No. 313 Harvesting and Storing Corn.

- b. Cotton: 464; Cottonboll weevil 465; Georgia 753.

Consult:

Farmers' Bulletin No. 217 Essential Steps in Securing an Early Cotton Crop.
Farmers' Bulletin No. 285 Advantage of Planting Heavy Cotton Seed.
Farmers' Bulletin No. 314 A Method of Breeding Early Cotton to Escape Boll-weevil Damage.

Farmers' Bulletin No. 333 Cotton Wilt.

- c. Grains and Grasses: Wheat 2073; Oats 1368; Rye 1650; Buckwheat 283; Barley 172; Flax 682; Linseed 1077; Rice 1610; Sorghum 1782; Millet 1227; Grass 795.

Consult:

Farmers' Bulletin No. 250 The Prevention of Wheat Smut and Loose Smut of Oats.

Farmers' Bulletin No. 132 Insect Enemies of Growing Wheat.

Farmers' Bulletin No. 300 Some Important Grasses and Forage Plants for the Gulf Coast Region.

Farmers' Bulletin No. 219 Lessons from the Grain Rust Epidemic of 1904.

Farmers' Bulletin No. 274 Flax Culture.

Farmers' Bulletin No. 27 Flax for Seed and Fiber.

Farmers' Bulletin No. 322 Milo as a Dry-land Grain Crop.

Farmers' Bulletin No. 110 Rice Culture in the United States.

Farmers' Bulletin No. 101 Millets.

Farmers' Bulletin No. 135 Sorghum Sirup Manufacture.

Farmers' Bulletin No. 279 A Method of Eradicating Johnson Grass.

Farmers' Bulletin No. 248 The Lawn.

d. The Legumes: Nitrogen gathering crops 1353; Alfalfa 46; Cow-peas 470; Clover 413; Pea 1432; Peanut 1434.

Consult:

Farmers' Bulletin No. 339 Alfalfa.

Farmers' Bulletin No. 194 Alfalfa Seed.

Farmers' Bulletin No. 373 Irrigation of Alfalfa.

Farmers' Bulletin No. 224 Canadian Field Peas.

Farmers' Bulletin No. 260 Seed of Red Clover and Its Impurities.

Farmers' Bulletin No. 323 Clover Farming on the Sandy Jack Pine-lands of the North.

Farmers' Bulletin No. 361 Meadow Fescue; Its Culture and Uses.

Farmers' Bulletin No. 315 Progress in Legume Inoculation.

Farmers' Bulletin No. 356 Peanut.

Farmers' Bulletin No. 318 Cowpeas.

Farmers' Bulletin No. 372 Soy Beans.

e. Tobacco: 1918.

Consult:

Farmers' Bulletin No. 83 Tobacco Soils.

Farmers' Bulletin No. 82 The Culture of Tobacco.

Farmers' Bulletin No. 60 Methods of Curing Tobacco.

Farmers' Bulletin No. 343 The Cultivation of Tobacco in Kentucky and Tennessee.

f. Hops: 885; Beer 193.

Consult:

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 What substance in the larkspur is very poisonous? 1032.
 From what is the oil of sweet bay taken? 1036.
 What Chinese order of honor is named from one of our favorite flowers? 396.
 What flower has a name meaning "little darling"? 1223.
 How did the narcissus get its name? 1302.
 What is smilax used for besides decorations? 1681.
 Where did the tuberose first come from? 1948.
 What are puff balls? 1559.
 Will seeds grow after being kept for years? 1718.
 What North American tree is fed upon by the silkworm? 1275.

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- What was the forerunner of chemistry? 41.
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 When do chemical changes take place? 374.
 What are some examples of chemical changes? 374-5.
 During these changes is there any gain or loss in total weight? 375

- What does this prove? 375.
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 What is the next most abundant element? 375.
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 What substances are now classed under inorganic chemistry? 375.
 How may mixtures and chemical compounds be distinguished? 375.
 What is an atom? 376.
 How can we explain the existence of several compounds of the same composition? 376.
 Who discovered oxygen? 376.
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 When alkalies and acids unite, what results? 50.
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 What did early chemists call "vital air"? 1406.
 Why does a man not feel the weight of thirty thousand pounds that the air presses upon him? 33.
 What are the principal elements in air? 33.
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 What produces cream on milk? 1225.
 What are examples of complete foods? 690.
 What is opium? 1386.
 What peculiar effect has hashish on the human system? 847.
 How does alcohol affect the system? 42.
 How does nitro-glycerine compare with gunpowder in power? 1354.
 What is the process of distillation? 535.
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 Who perfected the mode of mixing colors with oil? 643.
 What is the process of distillation of vegetable perfumes? 1452.
 How is soap made transparent? 1775.
 From what is bay rum made? 185.
 From what is plaster of paris made? 819.
 From what is isinglass made? 945.
 What is naphtha? 1300.
 What valuable medicine is made from the bark of the cinchona tree? 1576.
 Is sulphur a mineral or vegetable compound? 1846.
 What is phosphorus? 1475.
 Who discovered it and when? 1475.
 What gas, when changed to a liquid, is used in the manufacture of ice? 64.
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- What is the meaning of the letters R. S. V. P.? 3.
- When was perpetual motion overthrown? 1454.
- What is an Irish wake? 2033.
- Who invented dice and money? 1126.
- What metal is 3,000 times as valuable as gold? 1580.
- Who were the first magicians? 1144.
- Who invented the extract of beef? 1066.
- What is the oldest inhabited city in the world? 498.
- How can you tell mushrooms from toadstools? 1284.
- In what country was a wife buried with her husband? 1852.
- What religious brotherhood commits murder? 1908.
- What plant lives entirely on air? 622.
- What plant catches insects and uses them for food? 338.
- What American won a prize for picking the Bramah lock? 1106.
- Who founded the S. P. C. A.? 203.
- How is manila rope related to the banana? 861.
- What is the scientific name of a boy's top? 819, 1923.
- What is brown coal? 1070.
- Who invented the clock? 411.
- How did April Fool's day originate? 86.
- What was the ducking stool? 557.
- Who got up the present system of weather signals? 853.
- What city lost 100,000 people by black death? 683.
- When was the first Atlantic cable laid? 301.
- What is a boomerang? 244.
- What was the Black Hole of Calcutta? 306.
- What country is sometimes called the Coffee Republic? 463.
- What women use their hoods for cradles? 626.
- Who are the Brownies? 646.
- What are the Palisades? 894.
- What is the laughing hyena? 905.
- Who said: "Don't give up the ship"? 1039.
- How did the term "gerrymandering" come into use? 761.
- What state first adopted Arbor Day? 90.
- What was called the Dandy Horse? 210.
- What is the Maypole? 1192.
- What is the largest obelisk in the world? 1368.
- What is a pontoon bridge? 1526.
- What is St. Bernard noted for? 1655.
- What city represents the entire globe in the languages spoken? 1672.
- Where does slavery still exist? 1766.
- Where is the Pearl Mosque? 26.
- Who is said to have swallowed a \$400,000 pearl? 1435.
- Who built a throne at a cost of \$35,000,000? 1732.
- When was the first women's rights convention held? 1811.
- What place contains more people to the square mile than any other place in the world? 1335.
- What vase is considered the finest specimen of an ancient cameo cut glass that is known? 1533.
- What is meant by the Golden Age? 778.
- What was the Golden Fleece? 778.
- What terms are used for husband and wife by the gypsies? 818.
- Who was the Man with the Iron Mask? 939.
- What marble arch is said to be the finest in the world? 90.
- Tradition says that Washington was never known to swear but once. When? 1252.
- In what country is absinthe a popular liquor? 5.
- What were the shinbones of animals used for in early times? 1763.
- What village was made famous by the number of runaway marriages occurring there? 805.
- Where is the celebrated Vallombrosa Abbey? 2000.
- What was known as the Hudson Bay Company? 893.
- What was the famous Edict of Nantes? 896.

- What house of rulers, founded in the beginning of the ninth century, has continued an unbroken chain to the present day? 878.
- What are the Homestead Laws? 882.
- Where are the largest eggs found? 589.
- Where is the largest lock in the world? 1218.
- When was the period known as the Middle Ages? 1222.
- What does the term Dark Ages indicate? 1222.
- What cathedral contains 60,000 statues on the outside in the niches? 1223.
- What prince was believed by his countrymen to have discovered America three hundred years before Columbus? 1142.
- What woman born in prison became the wife of a king? 1151.
- What kind of a garment is a poncho? 1525.
- What woman was queen for only nine days? 806.
- Where is Mammoth Cave, and what is its size? 1155.
- Where are the cultivation and use of tobacco forbidden? 1264.
- What people call their country the Flowery Kingdom? 389.
- In what country are but few drunkards seen, and why? 390.
- What great city in ancient days boasted of having no citizen in want? 1526.
- What was the first express company? 642.
- Where are the Krupp gun works? 627.
- What people sent to Darius every third year four pints of gold dust? 629.
- What is the origin of "I came, I saw, I conquered"? 2131.
- At what place is the shortest day only three hours and twelve minutes, the longest twenty-one hours and forty-eight minutes? 91.
- Where is the noted stone circle, Stonehenge? 1832.
- What hermit spent thirty years on a tower? 1842.
- Who furnished the money for the Suez Canal? 1843.
- What was the Rye House Plot? 1650.
- Who vainly offered a city for a ruby? 1641.
- What is the largest and finest theater in the world? 1898.
- In what countries did they have lake dwellings? 1022.
- What nations have done most to improve the artillery service? 115.
- In what battle were modern arms first used? 107.
- Where is the most famous artesian well? 113.
- From what ancient city was the obelisk of Central Park in New York brought? 859.
- To whom was the name Puritans first given? 1564.
- What is known as a Pyrrhic victory? 1567.
- What valuable discoveries were made by Sir William Siemens? 1753.
- What was the South Sea Scheme? 1787.
- What was the Stamp Act? 1808.
- In what island did a three years' drouth cause over thirty thousand people to perish? 330.
- What is Cooper Union? 450.
- Which one of the seven wonders of the world was set on fire the night Alexander was born, and why? 621.
- What city founded in the tenth century contains architectural styles of almost every century since? 689.
- What were the Crusades? 483.
- Who were the Seven Wise Men? 1727.
- What were the Seven Wonders of the World? 1727.
- Who were the Seven Sleepers? 1727.
- What is meant by the term Sealed Orders? 1714.
- Where did the famous exploit of the Maid of Saragossa take place? 1679.
- At what ancient harvest festival were slaves banqueted by their master while he served them? 1683.
- What led to the expression, "Squatter Sovereignty"? 546.
- Who was Confucius? 441.
- What queen was crowned king? 395.
- What nation uses the most beer? 193.
- What is the amount of beer used in the U. S. for each person? 193.
- What is the largest bell in the world? 197.

- Who were the Mutineers of the Bounty? 1494.
 What is the greatest piece of blasting the world has ever known? 226.
 What is the Phi Beta Kappa fraternity? 1465.
 What is the value of a piaster? 1487; 2111. Of a rap? 2111.
 Who were the Picts? 1488.
 What was the Gunpowder Plot? 816.
 What was the Children's Crusade? 483.
 What abolitionist received the name of Ossawatimie? 275.
 What is international law? 933.
 Who were the buccaneers? 281.
 What was the Iron Age? 939.
 What was the charge of the Light Brigade? 150.
 Who wrote the famous line: "Westward the course of empire takes its way"? 203.
 What queen married a brewer because she was so much pleased with his dancing? 1949.
 When do equinoxes occur? 622.
 What people flatten their children's heads? 394.
 What city of eighty thousand people has no hotels? 1576.
 Where did Punch and Judy originate? 1561.
 What is Pompey's pillar? 1525.
 What was the Gordian knot? 781.
 Who was known as the Red Prince? 712.
 What island is called Sailor's Grave, and why? 1651.
 What was the Salic law? 1665.
 What people use birds' nests for soup? 247.
 When and where was the first clearing house established? 169.
 What is the highest volcano in the world? 464.
 What people allow snakes to come into their home and believe they are ancestors? 1725.
 What was the Stone of Destiny? 1707.
 When did riddles first come into use? 1613.
 What was the largest merchant vessel ever built? 1743.
 What place is called the White Man's Grave? 1754.
 When did the first system of shorthand come into use? 1747.
 When and by whom was the guillotine introduced? 812.
 What is a night dial? 526.
 What public woman opposed Lincoln's election? 530.
 What kingdom had an army of 10,000 soldiers mostly women? 496.
 What city is built over a vein of silver? 2128.
 Where were lotteries first known? 1116.
 What was the origin of lynch-law? 1126.
 How small were horses at one time? 639.

DISCOVERIES AND INVENTIONS

- What two brothers have conquered the air? 20.
 Who is famous as the inventor of wireless telegraphy? 1169.
 Whose experiments laid the foundation for wireless telegraphy? 1882.
 What telegraph system will send 150,000 words an hour? 1885.
 How many drawings and sketches be sent by electricity? 1881.
 When and by whom were roller skates invented? 1763.
 What did Elias Howe realize from his sewing machine? 1730.
 What is the process of electrotpe? 604.
 What are the Elgin marbles? 605.
 What famous inventor is called the "Wizard of Menlo Park," and how did he get his start? 582.
 From what fluid was India ink formerly made? 491.
 How are the different colors produced in fireworks? 676-7.
 What is the difference between an ordinary and an instantaneous fuze? 726.
 What is a petard? 1459.
 Who first introduced steel as a material for constructing guns? 1013.
 When was the first law of patents passed? 1428.
 Who is credited with first unwinding a silk cocoon? 1757.
 How long does a patent right last? 1428.

- Who perfected the Remington typewriter? 1963.
 Whose invention was the foundation of the wealth of the cotton-growing states? 2080.
 For what is a telemeter used? 1833.
 Who is the inventor of the gas motor? 740.
 Whose invention was the starting point for our modern rifle? 1614.
 When was gun cotton invented? 815.
 What nation is thought to have invented gunpowder? 815.
 What three important discoveries were made by means of the Coast Survey? 415.
 When was the first microscope made? 1220.
 When was nitroglycerine discovered? 1354.
 What is the Nobel prize? 1354.
 What doctor gave us the word "electric"? 596.
 Who invented the linotype and monotype machines? 1962.
 Who is undoubtedly the inventor of the telephone? 1884.
 When were steel sewing needles first made? 1317.
 Where are spectacles said to have been invented? 1793.
 What electrical discoveries were made by Stephen Gray? 596.
 What important improvements were made by Mr. Sprague in 1887 in electric railroads? 601-2.
 What discovery of Witt's must rank as one of the important astronomical discoveries of recent years? 126.
 What machine is based on the discoveries of Prof. Ferraris of Italy? 601.
 What discovery did Copernicus make? 128.
 Where was the first electric railway? 601.
 Who invented the needle gun, and when? 553.
 When was dynamite invented? 568.
 What important discovery did Faraday make with electricity in 1831? 568.
 Who invented the grand piano? 623.
 Whose invention changed the navies and navigation of the world? 1913.
 What art was invented by Senefelder? 1100.
 Who built the first lifeboat? 1067.
 Who designed the lifeboat, and when? 1067.
 How old is the process of tanning skins, and where invented? 1043.
 What is the earliest and simplest form of engraving, and by what country was it introduced? 2106.
 How are depths of great bodies of water found? 1783.
 When was the first typewriter invented? 1963.
 Who invented printing with movable type? 817.
 Who invented the process of puddling and rolling? 939.
 What is the Bessemer process of making steel? 1820.
 Who invented the power loom? 343.
 When did balloons come into use? 19.
 Who discovered the true cause of the tides, and how? 1911.
 In what city have nails been manufactured for 300 years? 1298.
 What is the origin of the telephone? 1884.
 Who designed and built the first locomotive in America? 450.
 Where were the first galley boats made? 455.
 When was the first fountain pen used? 1443.
 What led Edison to the discovery of the phonograph? 1474.
 How was paper first made? 1417.
 How is papier maché made? 1418.
 When and where was the first life-boat built? 1066-7.
 How is parchment prepared? 1420.
 What is the process of stereotyping? 1823.
 Who invented the first steam hammer? 1817.
 Who made the "Rocket" steam engine famous, and who was its builder? 1817.
 Who invented the stereoscope? 1823.
 When and by whom was stereotyping invented? 1823.
 When and where was the first telegraph line laid successfully? 1267.
 Who was the inventor of glass? 773.
 What led to the invention of the spinning jenny? 838.

- When and by whom was the first blast furnace worked? 939.
 When and by whom was the flint lock gun invented? 814.
 Who invented macadamizing, and where first introduced? 1129.
 Who invented the spinning mule? 481.
 How long has irrigation been practiced? 940.
 What was the first cotton mill built in the United States? 465.
 Who was the founder of the science of hydrography? 1191.
 What important invention did Sir Humphrey Davy make, and what led to the discovery? 1652.
 What led to the discovery of the photophone? 1478.
 How and by whom was the Silurian system discovered? 1280.
 When and by whom was gas invented for use as lighting purposes? 1280.
 What is the process of vulcanizing rubber, and who discovered it? 920.
 How early was steam used for moving boats? 1818.
 What was the first steam vessel to make a voyage? 1818.
 What discovery led to the invention of the barometer? 174.
 Why are some bricks red and some buff colored? 265.
 How is charcoal made? 367.
 What led to embalming among the Egyptians? 591.
 What is the process of photography? 1476.
 In how many seconds will an air brake stop a train going 50 miles an hour? 259.
 How are new inventions protected? 1428.

EDUCATION

- What college graduated lady physicians in the 12th century? 1987.
 May women study at Harvard? 1988.
 What college did George Washington endow? 2024.
 Where was the degree of bachelor first introduced? 1987.
 Who invented our punctuation marks? 1561.
 Who discovered the profession of teaching? 945.
 What college was founded by Henry VI in 1440? 630.
 What was the procession of the boys to Salt Hill for? 630.
 Who were the best educated people in Europe in the 18th century? 1708.
 Who were the bookmakers and translators of the middle ages? 1063.
 What is the oldest university in Germany? 760.
 In what strange way have some early manuscripts been discovered? 1412.
 Why did Pestalozzi write "How Gertrude Educates Her Children"? 1459.
 Who was the founder of comparative geography? 1617.
 What was the cause of the Associated Press, and when organized? 123.
 What is the largest Catholic institution in the west? 1783, 1990.
 What university was founded under the auspices of King George II of England? 1987.
 Where is the oldest Scandinavian university? 1987.
 What country ranks first in universities? 760.
 How many years did Noah Webster spend in preparing the American Dictionary? 2063.
 What woman founded a seminary upon the plan of uniting domestic labor with intellectual culture? 1127.
 Where and what is the largest library in the world? 1064.
 When was the first circulating library started in London? 1063.
 What is the school system of Württemberg? 2133.
 What university chooses its chancellor for life without a salary? 1405.
 Where was the first Sunday School held in America? 1849.
 What is the artillery school instituted for? 115.
 Where is the oldest university of central Europe? 1987.
 What are the characteristics of the universities of England that differ from others on the continent? 1987.
 When was the oldest university founded in Germany? 760.

- How are the universities of Germany controlled, differing from others? 760.
- Where was the first book published in the United States? 313.
- What is the Pool of Knowledge? 199.
- What is the polite language? 1028.
- Who is the greatest of all letter writers? 1058.
- When was Webster's Dictionary first published? 2063.
- What history is held to be the authority on Chinese life and manners? 2089.
- What university in the United States resembles the German universities in its methods? 1988.
- What is the oldest university in the United States? 1988.
- What was the second college founded in the United States? 2024.
- What is the oldest university of Scotland? 1987.
- What was the earliest and most famous of the colleges in the middle ages of Paris? 1987.
- When and where was the first teachers' institute held? 1877.
- What great reformer spent most of his life in perfecting the kindergarten system? 719.
- Who formed the Chautauqua assembly? 374.
- What country requires every child to have three years' schooling? 1857.
- What important educational institute is located in Baltimore? 164.
- What state has the largest school fund? 1241.
- What university had from 6,000 to 8,000 students in the thirteenth to the end of the seventeenth century and now has only 1,200 students? 1664.
- Who established the Working Men's Institute in Brighton? 1620.
- What was the first real science or system of political economy? 1517.
- When and where was the first polytechnic school established? 1522.
- Who was the founder of analytical geometry? 522.
- Who was the father of geometry? 631.
- Who founded Christ Church College at Oxford, England? 2104.
- What empress used her wedding gifts for endowing a college for women? 631.
- In what famous college did American missions to the heathen start, and by whom started? 2089.

TEACHING.

- How does apperception differ from ordinary perception? 83.
- How do Leibnitz and Kant use the term apperception? 83.
- What does Herbart teach about experience? 84.
- What gives the teacher his clue as to what the child can learn? 84.
- How is apperception important to the course of study? 84.
- What discovery has given a new development to the idea of apperception? 84.
- What is association of ideas? 123.
- What does Locke assume regarding this association? 123.
- What does Hartley say all mental processes depend upon? 124.
- What is the only real explanatory law of association? 124.
- How is association of ideas connected with apperception? 124.
- How may big trees and elephants be associated? 125.
- What do modern psychologists hold of all mental elements? 125.
- What is the meaning of the word psychology? 1556.
- Can mind or matter be defined? 1557.
- Who maintain that mind is the only reality in the universe? 1557.
- Who holds that mental acts are qualities of matter? 1557.
- What are the three divisions of the mental faculties? 1557.
- What lies back of education? 1557.
- What is the end of education thought to be? 1557.
- What is the most important example of the analytic method of teaching? 1558.
- What does the training of the mental powers consist of? 1558.
- What is the main business of education? 1201.
- What are the two methods of memorizing? 1201.
- What is the backbone of effective memory? 1201.

Tying a string around one's finger is called what? 1201.
 What is interest based on? 931.
 Why has interest been looked upon with suspicion? 931.
 What did Rousseau declare? 931.
 Why was Rousseau's educational scheme one-sided? 931.
 Why do we become interested in things? 931.
 What is soft pedagogy? 932.
 What does character mean? 932.
 What was Rousseau's idea of child education? 384.
 What does Herbart require of the teacher? 384.
 What was the most interesting conception of Froebel? 384.
 Who wrote "The Soul of the Child"? 385.
 What is a valuable clew to the interests of children? 384.
 How can a teacher get a pupil to learn? 385.
 What is the dynamic force of learning? 652.
 What is the secret of men's capacity to learn? 385.
 Why is the term feeling ambiguous? 652.
 What is the relation between feeling and cognition? 652.
 How do disagreeable feelings help us? 653.
 Can we have emotion without organic sensations? 653.
 How is emotion a valuable aid to education? 653.
 Why has the study of Latin been advocated? 1204.
 How did religious conceptions develop character? 1204.
 What is the faculty theory? 1204.
 How should all studies justify themselves? 1204.
 Will memorizing Shakespeare help to learn the rules of grammar?
 1204.
 What is the most important use of correlation? 1205.
 How is the term imagination ordinarily used? 916.
 How does imagination differ from memory? 916.
 What is the value of imagination? 916.
 Does imagination help the farmer, the mechanic, the milliner? 917.
 What will make the pupil critical but not productive? 917.
 How is habit distinguished from instinct? 821.
 What is habit indispensable to? 821.
 How may old habits be broken? 821.
 At what age are our habits formed? 821.

MODERN EDUCATION.

What are the five great epochs in educational history? 584.
 What is necessary for a liberal professional preparation for teaching?
 584.
 What is an extremely valuable work in education? 584.
 What has been done to disciplinary subjects? 584.
 What system of education was created in the 19th century? 585.
 Is education in the U. S. controlled by the states or by the Federal
 government? 585.
 How many acres of land have been granted for state schools? 585.
 What is the most important relation of the school garden? 1691.
 Why are normal schools taking up school gardens? 1691.
 What great universities have taken up school agriculture? 1691.
 What does school organization and management embrace? 1691.
 What is school sanitation? 1691.
 How many cubic feet of pure air does each pupil need? 1692.
 What are school ships? 1692.
 What are the three periods of school song work? 1693.
 Why should a careful selection of school songs be made? 1692.
 What does the song, "Bring the Comb," picture? 1693.
 What are the teaching points gained by school songs? 1693.
 What are the difficulties of music in high schools? 1695.
 What is the function of public school music? 1695.
 What are the three essential means for comprehending music? 1286.
 How does the second phase of music study differ from the first? 1287.
 How should the motif be used? 1288.
 How has modern invention helped the study of music? 1288.
 What does musical notation deal with? 1288.

- What is a key? 1289.
 What is the key signature? 1290.
 What is the meaning of largo, andante, allegro, presto? 1290.
 How was literary education confined in the middle ages? 1695.
 When was compulsory attendance established in Germany? 1695.
 What idea did the Reformation bring? 1695.
 Who were the Brethren of the Christian Schools? 1695.
 In the beginning what was the end of popular education? 1695.
 In what country must any school have official sanction? 1696.
 In what condition were free schools in 1835, in Massachusetts? 1696.
 In what way is elementary education superior in Europe? 1696.
 How is American education better than that of Europe? 1696.
 What are district schools? 1697.
 Where are Indian schools? 1697.
 What widespread movement is decreasing rural schools? 1697.
 How does attendance differ in city and rural schools? 1697.
 What are graded schools? 1697.
 In what schools is each pupil a class by himself? 1697.
 How are rural schools managed? 1697.
 What is one of the firmly fixed beliefs of the American people? 1698.
 What is the state school tax? 1698.
 How were permanent school funds formed? 1698.
 What is the most important problem of rural schools? 1698.
 Why are few trained teachers found in rural schools? 1699.
 What is said of "the little red schoolhouse"? 1699.
 How many million children attend country schools? 1699.
 Where was the first experiment of centralizing schools? 1700.
 What is the plan of consolidation and transportation? 1700.
 Does rural education cost more under the new plan? 1700.
 What are the benefits of school board conventions? 1700.
 What important plan of reform is considered by Congress? 1701.
 When will life on the farm be better than any other life? 1701.
 What is the aim of secondary schools? 1701.
 What are the secondary schools of Germany? 1701.
 What took the place of the Jesuit schools in France? 1701.
 Where are these schools devoted entirely to the classics? 1701.
 Where was the first high school established in the U. S.? 1702.
 What difficult situation is the high school in? 1702.
 How many high school students complete the course? 1163.
 What is the most popular type of summer schools? 1702.
 What is unique in the University of Chicago summer school? 1703.
 What are the different schools for defectives? 1703.
 What is the "sign language"? 1703.
 Where were the first American schools for the blind? 1703.
 How is commercial education conducted in the U. S.? 1703.
 What two cities have high schools of commerce? 1704.
 Where are colleges of commerce established? 1704.
 Where were correspondence courses first organized? 461.
 Is correspondence instruction satisfactory? 461.
 What should correspondence students guard against? 461.
 What are continuation schools called? 448.
 Which state leads in continuation schools? 448.
 How many continuation schools conducted by the Y. M. C. A.? 449.
 What is one secret of the industrial advance of Germany? 449.
 What is correlation of studies? 460.
 How would Ziller use the story of Robinson Crusoe? 461.
 Where was the first public normal school established? 1355.
 What is the most valuable normal school work? 1356.
 What four studies should amount to one-fourth of the entire normal course? 1356.
 What is sloyd? 1768.
 What is the fundamental tool in sloyd? 1768.
 In what country did sloyd originate? 1768.
 In what city did manual training schools begin? 1162.
 Where was the first manual training exhibit in the U. S.? 1162.
 What does manual training include in public schools? 1163.

- What is the value of manual training on the artistic side? 1163.
 What materials are needed for manual training in the first grade? 1163.
 What are industrial schools a substitute for? 924.
 What did industrial drawing in public schools lead to? 924.
 When was the first public system of industrial schools established in the United States? 925.
 What are polytechnic schools? 1522.
 What is the name of the oldest polytechnic school in the U. S.? 1523.
 Are polytechnic schools efficient? 1523.
 How has the business college been of immense value? 295.
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 How does the Pacific climate compare with that of Italy? 1968.
 What makes the U. S. a world in itself? 1969.
 When does the rain fall on the Pacific coast? 1969.
 What minerals give the U. S. first rank in production? 1969.
 What country leads in gold production? 1938.
 How much of the country was originally forest? 1970.
 How many acres of forest are there now? 1970.
 Where is the heaviest stand of timber on earth? 1970.
 What are the most important fish? 1970.
 In what industries does the U. S. lead the world? 1970.
 How much of the world's manufactures come from the U. S.? 1970.
 What are the chemical and allied industries? 1970.
 How does the U. S. stand in agriculture? 1970.
 How many families live on farms? 1971.
 What are the bulk of the exports? 1971.

- How does cotton compare with corn as an asset in the U. S.? 1971.
 How does hay compare with cotton? 1971.
 Where is most of the woodland? 1972.
 What rank does lumbering hold in the U. S.? 1972.
 What port does half of our foreign trade? 1972.
 How many miles of canals are used for transportation? 1972.
 What is the length of the 38 principal canals in the U. S.? 1973.
 How much of the U. S. foreign commerce is carried in foreign ships?
 1973.
 How much of the world's railways are in the U. S.? 1973.
 How many cables connect the U. S. with Europe? 1973.
 What other cables are there? 1972.
 How long does it require to send mail from New York to San Francisco? 1973.
 Which of the Great Lakes is entirely in the U. S.? 1022.
 What summer resorts are planted in deserts of sand? 1112.
 What was discovered in N. Y. harbor by the Coast Survey? 415.
 Where is the Piedmont region? 1489, 59.
 Where is the heaviest rainfall in the U. S.? 1582.
 Where are the National Parks? 1306.
 What is the great corn state of the Union? 935.
 What city was the chief whaling center of the world? 1324.
 Where are the "Bad Lands" of the United States? 1786.
 What city in the United States is the first naval stores station and
 second cotton port of the continent? 1683.
 What city in the United States is third in importance as to exports?
 1330.
 When were the first sheep introduced in the United States? 1736.
 What state in the Union stands foremost in manufacturing? 1732.
 What state furnishes one third of the gold, silver, copper, lead etc.
 mined in the United States? 1254.
 What is the first manufacturing city in the Union? 1332.
 What range of mountains have twenty-five peaks, the names of five
 of them being those of presidents of the United States? 2079.
 Why is Oregon much warmer than other places of the same latitude?
 1391.
 What lake in the United States contains three thousand islands? 900.
 Which state of the Union was once covered with a great lake? 1786.
 What is the longest unnavigable river in the United States? 1786.
 What state in the United States contains 10,000 lakes? 1236.
 What is the highest mountain peak in the United States outside of
 Alaska? 308.
 How many square miles does the United States contain? 1967.
 What is the most famous peak of the Allegheny Mountains? 51.
 What two rivers form the source of the Ohio River? 51.
 What state in the United States contains an extinct crater that is
 now one of the deepest freshwater lakes in the world? 1391.
 How many miles of railroad in the United States? 1581.
 How many miles of railroad in the United States in 1900? 1582.
 How many miles of railroad in the world in 1900? 1582.
 What is the value of the salmon fisheries in the U. S.? 1666.
 In the United States what grain yields the chief crop? 30.

THE NEW ENGLAND STATES.

- How much longer is Maine's tide line than the coast? 1149.
 What is the most important stream of New England? 1449.
 How does the watershed cross the state? 1150.
 What is the temperature of Maine winters? 1149.
 Where is one of the largest salmon pools in the world? 1150.
 What are 2,000,000 bushels of potatoes used for annually? 1150.
 What state has considerable mica deposits? 1325.
 How does Vermont compare with New Hampshire in industrial pro-
 ducts? 1012.
 Why is Massachusetts the least agricultural state in the Union? 1185.

Where is the most notable tunnel in the U. S.? 885.
 How does Boston rank in foreign trade? 249.
 What mines have been worked in Connecticut since 1730? 444.
 What is the character of silverware made in Rhode Island? 1607.

THE ATLANTIC STATES.

Why is New York the Empire State? 1331.
 What enables New York to lead in manufactured goods? 1332.
 What is the extent of exports and imports? 1333.
 How many minutes does it take to walk across New York City? 1334.
 What supports the weight of New York City? 1335.
 What are the five boroughs of New York City? 1336.
 What are the Palisades? 894.
 How long is the Erie Canal? 321.
 What two canals are used in New Jersey? 1328.
 Where is the seat of the silk trade? 1327.
 What river forms the entire eastern boundary of Pennsylvania? 1446.
 Where are the largest Bessemer mills in the world? 1447.
 How does Pennsylvania compare with New York in agriculture? 1448.
 In what products does Pennsylvania lead all states? 1447.
 What are the four divisions of the mountain systems of Pennsylvania? 1446.
 What rank does Philadelphia hold as a manufacturing city? 1466.
 Of what importance is Allegheny City? 51.
 How does Delaware compare with Rhode Island in size? 516.
 How does the Mason and Dixon line bound Maryland? 1181.
 What is the leading industry of Maryland? 1182.
 What two canals in Maryland? 1182.
 What are the largest meat-packing industries on the Atlantic seaboard? 164.
 What is tidewater Virginia? 2023.
 What mines of Virginia are the largest in the world? 2023.
 What two products are peculiar to Virginia? 2024.
 What two natural wonders in Virginia? 2023, 1124.
 Why is West Virginia called the Switzerland of America? 2071.
 What is the area of the coal fields? 2071.

THE SOUTHERN STATES.

How does North Carolina compare in size with Pennsylvania? 1357.
 Where are the government hatcheries? 1357.
 How does it compare with Kentucky for tobacco? 1357.
 What is said of its wonderful waterpower? 1357.
 How does it lead the southern states? 1357.
 What are the low country and the up country of South Carolina? 1784.
 How does this state lead the world? 1784.
 Where are the beds of phosphate rock? 1784.
 Where is the safest harbor on the Atlantic coast? 371.
 How does Georgia compare in size with New England? 752.
 How many climatic belts in the state? 753.
 Where is the famous Georgia marble found? 753.
 What valuable cotton is grown in Georgia? 753.
 Where is the largest tobacco farm in the world? 753.
 Where is the leading naval stores port in the world? 1683.
 How many clear days in the year in Florida? 684.
 What are its most important crops? Minerals? 684.
 What is the leading industry of the state? 684.
 What are the Florida Keys? 684.
 What is the greatest engineering feat of recent years? 684.
 What city is built on a coral island? 1001.
 What crop is grown in the famous black belt of Alabama? 35.
 What rank has the state in iron ore production? 36.
 How many miles of navigable rivers? 36.
 What is the only seaport of Alabama? 1244.
 How are funds raised for the levees in Mississippi? 1240.
 What is the most valuable tree? 1240.

How does the cotton crop compare with Texas? 1240.
 Why is the state of Tennessee divided into sections? 1889.
 Where is the garden of Tennessee? 1889.
 What do the mountain caverns contain? 1889.
 How is Memphis supplied with drinking water? 1202.
 How does the soil of the east of Oklahoma differ from that of the west? 1377.
 What is the character of the surface? 1376.
 Where are "some of the richest oil fields in America"? 1377.
 How is the name of the state of Arkansas pronounced? 100.
 What success in the culture of rice has the government had? 101.
 Where is the largest oar factory in the world? 101.
 What unique distinction has Hot Springs? 101.
 Where are the famous whetstone quarries? 888.
 How long is the Texas coast line? 1985.
 Where does most of the salt used in the state come from? 1895.
 How does Texas rank in cotton production? 1895.
 Where is the Pan-Handle of Texas? 1895.

THE CENTRAL STATES.

How does Kentucky lead in navigable streams? 998.
 How has the climate improved the people? 998.
 What is wonderful about the soil? 998.
 What is said of the hardwood forests? 998.
 What is said of tobacco, hemp and horsebreeding? 999.
 What is the shape of Ohio? 1373.
 What comment has been made on the climate? 1373.
 What beautiful stone does the state produce? 1374.
 How many million barrels of petroleum are produced? 1374.
 Where is one of the largest rolling mills in the world? 1374.
 Why is Cleveland called the Forest City? 409.
 What celebrated pottery is made in Cincinnati? 400.
 How does the state of Indiana rank in size? 920.
 Where is one of the most fertile regions in the world? 920.
 How many miles of electric lines? 921.
 What prevented Lake Michigan from flowing into the Illinois river?
 915.
 How deep is the vegetable soil of Illinois? 915.
 How does the state rank in railroads? 916.
 How much of the U. S. coal fields are in the state? 915.
 What caused mail wagons to disappear in Chicago? 382.
 What waters originally covered the site of Chicago? 379.
 Where is the largest canal lock in the world? 1218.
 How much of the total iron ore production comes from Michigan? 1218.
 What commercial event happens twice a year in Grand Rapids? 793.
 How does Michigan rank as a fruit state? 1219.
 What magnificent park is connected with Detroit? 523.
 What is most of the surface of Wisconsin covered with? 2098.
 What is its rank as a manufacturing state? 2099.
 How many dairy cows in Wisconsin? 2098.
 Why is Milwaukee called the Cream City? 1229.
 What rank does Milwaukee hold as a grain port? 1229.
 What three great river systems have their source in Minnesota? 1236.
 What is the best wheat in the world? 1236.
 Where are the Big Woods? 1236.
 Where is the largest primary wheat market in the world? 1235.
 What are the Twin Cities? 1661.
 What is remarkable about the Red River tract of North Dakota? 1358.
 What salt lake in the state has no outlet? 1358.
 What is the enormous yield of wheat? 1358.
 Where are the Bad Lands of South Dakota? 1786.
 What is the principal grain of the state? 1786.
 What industries flourish in the state? 1786.
 What are nearly all buildings in Sioux Falls made of? 1761.

- What is the character of the surface of Iowa? 935.
 What are the two hydrographic regions? 935.
 How does Iowa rank in the production of corn? 935.
 What is the annual production of the brick and clay factories of Des Moines? 523.
 Why are there little extremes of heat or cold in Nebraska? 1314.
 What is a drawback to manufacturing? 1314.
 Where are the railways chiefly located? 1315.
 Where is the largest creamery in the U. S.? 1073.
 What curious caverns in the state of Missouri? 1341.
 Why is the climate marked by extremes? 1241.
 What mineral does it produce more than any other state? 1241.
 What is the immense income of the Missouri Botanical Garden? 1660.
 What important geographical position has Kansas? 988.
 What has increased the skill of the Kansas farmers? 989.
 Where is one of the most modern beet-sugar factories in the world? 990.
 In what industry does Kansas rank first? 990.
 How does Kansas stand in wheat production? 990.
 What great industry is carried on in Kansas City, Kansas, and Kansas City, Mo.? 991.

THE NORTHWESTERN STATES.

- What is the character of the Bad Lands of Montana? 1254.
 What curious geyser is in Deer Lodge Valley? 1254.
 What makes the climate healthful? 1254.
 How does Montana stand in the production of sheep and wool? 1255.
 Where is the largest smelter in the world? 1255.
 What is the peculiar shape of Idaho? 912.
 What makes the scenery varied and grand? 912.
 What is the law of the state regarding water supply? 913.
 What immense lumber mill at Potlatch? 913.
 How does the climate of Washington differ in the west and the east? 2045.
 How many Federal forest reserves in the state? 2045.
 Through what port does the bulk of Alaskan trade pass? 1715.
 What makes the delightful climate of western Oregon? 1391.
 For what fruits is Oregon famed? 1392.
 Where are the hop farms of Oregon? 1391.
 What port leads the world in lumber exports? 1392.
 Why is the state of Wyoming not adapted for agriculture? 2115.
 What splendid showing is made in wool production? 2115.
 Where is Yellowstone Park? 2115.
 How large is Yellowstone National Park? 2122.

THE SOUTHWESTERN STATES.

- How many groups of mineral springs in the state of Colorado? 428.
 How much land did Congress give to the public schools? 428.
 How does the state rank in producing hard coal? 428.
 What prehistoric remains are in the state? 429.
 Where do the breeders of the north and the south meet? 521.
 Where are the greatest natural bridges in the world? 1994.
 What is the altitude of Utah? 1994.
 What is the finest building in Salt Lake City? 1667.
 Are there any fish in Great Salt Lake? 800.
 How does Nevada compare with other states in population? 1323.
 What is irrigation doing for the state? 1323.
 What has given a new impetus to mining? 1323.
 Where is the hottest and driest region of our country? 308.
 How does the climate of the state of California affect the soils? 308.
 Where are the fruit and the gold regions? 309.
 Where are trees 325 feet high and 120 feet in circumference? 309.
 How will the Panama Canal affect California? 310.
 What is the Golden Gate? 1671.

TERRITORIAL POSSESSIONS.

- How much of the United States territory is in Alaska? 37.
 How long is the Yukon River? 37.
 How does the Japanese current affect the climate? 37.
 How much of the salmon product comes from Alaska? 38.
 What was the later name of the Hawaiian Islands? 848.
 How does the temperature vary? 848.
 What important and valuable position has Hawaii? 848.
 What splendid landlocked harbor in Hawaii? 1435.
 How many islands in the Philippine group? 1470.
 How is the climate in July and August? 1470.
 What valuable service is rendered to agriculture by the government?
 1470.
 What is the chief product? 50.

CANADA.

- What does Canada comprise? 316.
 Is Canada as large as the United States? 316.
 How does the population compare with Belgium's? 316.
 How many miles between Halifax and Vancouver? 316.
 How many miles from Victoria to Dawson? 316.
 What countries are in the latitude of its southerly portion? 316.
 In what latitude is its most northerly portion? 316.
 What does the older Canada comprise? 316.
 What are the maritime provinces of Canada? 316.
 Where are the eastern provinces? 316.
 Where are the central provinces? 316.
 What is the Pacific province? 316.
 Where does the northern province lie? 316.
 How do the summers and winters compare with those of Europe? 317.
 How does the Japanese current affect the climate? 317.
 Where are precious metals found in abundance? 317.
 Where is the Laurentian Range of Hills? 317.
 How is the lack of coal in this range replaced? 319.
 What three rivers are among the largest in the world? 317.
 What is one of the greatest sources of national wealth? 317.
 How is the irregular triangle of prairie bounded? 317.
 What is Canada destined to become? 317.
 What trade has gained 90 per cent in ten years? 317.
 What is the total of Canada's exports? 317.
 Where is most Canadian wheat shipped to? 317.
 How many wood-pulp mills are there in Canada? 317.
 What are the chief mining provinces? 318.
 What is the value of coal produced yearly? 318.
 What makes smelting economical in Nova Scotia? 318.
 Where are the only nickel producing localities in the world of any
 consequence? 318.
 What mine contains enough nickel ore to supply the needs of the
 world for all time? 318.
 How is copper produced in these mines? 318.
 What mines supply the world with asbestos? 318.
 Where are the greatest placer gold-mines in the world? 318.
 Where is one of the richest silver camps in the world? 318.
 What is the value of silver produced in 1908? 416.
 How many miles of the Yukon river are navigable? 2127.
 When was gold discovered in the Klondyke River? 2127.
 What vegetables grow in Yukon? 2127.
 Where is the fishing ground of North America? 318.
 How many Canadian fishermen are employed? 318.
 Where do the salmon impede the flow of the rivers? 318.
 How many government hatcheries are there? 318.
 What is the largest steel-arch railway-bridge in the world? 318.

- Where will be the largest irrigation system on the American continent? 320.
- How much do the settlers pay for irrigation water? 320.
- What railway furnishes a highway round the world? 320.
- Where is the Canadian Northern Railway? 320.
- What will be the total mileage of the Grand Trunk Pacific Railway Co.? 320.
- What is the greatest waterway in the world? 319.
- When will Canada be the Granary of the Empire? 1160.
- What province has no waste country? 39.
- In what province is the mean temperature 62.7 degrees in summer and 6.9 degrees in winter? 1682.
- Where is the watershed of the Pacific slope? 269.
- What province is a vast sanitarium? 270.
- Where is one of the best deep water harbors on the Pacific Coast? 2001.
- What river in Canada is 2,400 miles long? 1137.
- What Canadian province has no hotels? 1017.
- Where is one of the chief centers of herring fishing? 1017.
- What Canadian territory is named after Sir John Franklin? 708.
- What city brings its electrical supply 80 miles? 319.
- How much larger is Ontario than the United Kingdom? 1383.
- What are the world scenic features of Ontario? 1383.
- What are the five leading sources of wealth? 1383.
- How do the Great Lakes affect the climate? 1383.
- What peninsula is the finest part of Ontario? 1383.
- What part is a vast fruit farm? 1384.
- What province has no direct taxation for provincial purposes? 1363.
- Where are one fifth of Canadian fish caught? 1324.
- What is the garden province of Canada? 1547.
- Where has an experimental farm been for 50 years? 1548.
- How long was Newfoundland the only English colony in America? 1341.
- What made England a nation of sailors? 1341.
- By whom was Newfoundland colonized? 1341.
- Why is it a good naval base? 1342.
- Where is an immense game preserve? 1342.
- How large is the catch of cod yearly? 1342.
- How much is fit for agriculture? 1342.
- Where is one of the most valuable iron mines in the world? 1342.
- What is the chief center of salmon fishing? 1342.
- What are the Banks of Newfoundland? 1342.
- What is the nearest port in America to Europe? 1342.
- Why are all school examination papers sent to England for marking? 1342.
- How does Quebec compare in size with the British Isles? 1571.
- Is Montreal nearer to Europe than New York? 1572.
- When were the provinces of Alberta and Saskatchewan added to the Dominion? 320.
- How are the Northwest Territories governed? 1360.
- What do the Northwest Territories comprise? 1360.
- How could the Mackenzie river be made the longest inland water-route in the world? 1137.
- How is trade carried on in the Mackenzie District? 1138.
- What is most interesting about the Keewatin District? 893, 995.
- From what province will Canada get iron ore in the future? 1966.
- How does the Labrador current benefit the fisheries? 1016.
- Why is Quebec cut off from the Atlantic? 1571.
- What per cent. of the population of Quebec are Catholics? 1572.
- How many square miles of forest land in Quebec? 1572.
- How long is Victoria bridge, Montreal? 266.
- What beautiful cataract near the Dominion capital? 374.
- What makes navigation of the Bay of Fundy dangerous? 724.

- What is the most northerly of Canada's great lakes? 798.
 What city on the Atlantic is strongly fortified? 827.
 What is the largest river in Canada? 1137.
 What cataract in Quebec is 250 feet high? 1257.
 What portion of Newfoundland is covered by lakes and rivers? 1342.
 What does the name Niagara signify? 1345.
 What volume of water per minute passes over Niagara Falls? 1345.
 What is the estimated amount of power at Niagara? 1346.
 Why was Prince Edward Island called a "low and beautiful land"? 1547.
 What is the total area of the Rocky Mountains? 1622.
 What island is called "the sailor's grave"? 1651.
 What is the nearest port in America to Europe? 1658.
 Where are the headquarters of the consolidated Six Nations? 260.
 How much money has Canada spent on canals? 319.
 How high is the head of Lake Superior above the head of tidewater? 1659.
 What are the total imports of Canada? Also exports? 317.
 How long is the St. Clair tunnel? 1656.
 Where is that natural wonder called the "reversible falls"? 1658.
 What is the value of cheese exported? 317.
 What is the value of the fish catch per year? 318.
 How many miles of railway in operation in Canada? 318.
 Where is irrigation employed extensively in Canada? 320.
 What is the annual value of Canada's timber exports? 317.
 How much nickel has been taken from the Sudbury mines? 318.
 How much gold has been mined in Canada? 318.
 What parts of Canada have supplied the most gold? 318.
 What is Canada's coal area? 318.
 How much land has Ontario left for settlement? 1383.
 What city is at the head of ocean navigation? 1258.
 Where is the famous Cobalt mining center located? 416.
 How rapidly is Ontario being settled? 1384.
 Where is the Agricultural College of Ontario? 810.

MEXICO AND CENTRAL AMERICA.

- How large is Mexico? 1214.
 What is the length of the coast line? 1214.
 What is the one good harbor? 1214.
 How high is the tableland of Mexico? 1214.
 What peak is 17,540 feet high? 1214.
 What is the largest river and lake of Mexico? 1214.
 How many salt lakes in the valley of Mexico? 1214.
 Where is the region of perpetual spring? 1214.
 Where is an extensive field for the botanist? 1214.
 What are the 353 species of birds famed for? 1214.
 What regions have been exploited for 400 years? 1214.
 Why has Mexico been called a "horn of plenty"? 1215.
 What are the products of the lowlands? 1215.
 Where are coffee and cereals grown? 1215.
 How many crops of corn can be grown in a year? 1215.
 What is the Department of Promotion? 1215.
 What rank does Mexico hold in exporting hides and skins? 1215.
 What interoceanic railway was opened in 1907? 1216.
 What is the prevailing religion? 1216.
 Are all religions tolerated? 1216.
 What kind of government has Mexico? 1216.
 What ancient people founded the City of Mexico? 1213.
 What cathedral was a century in building? 1214.
 What drains the valley of Mexico? 1214.
 What are the boundaries of Central America? 60.
 How does it differ from North and South America? 60.
 What are the area and the population? 60.

What is the largest inland lake south of the Great Lakes? 60.
 How much rain falls in Panama? 60.
 What are the chief products? 60.
 What ancient people made their home here? 60.
 Which country is a British possession? 60.
 Where is the republic of Panama? 1415.
 When was the Panama Canal first talked of? 1415.
 Why did Panama secede from Colombia? 141.

SOUTH AMERICA.

What are the length and width of South America? 61.
 In what direction is it from North America? 61.
 What important inlets on the coast? 61.
 What mighty range of mountains on the western coast? 61.
 What is the highest point on the western hemisphere? 61.
 Why have the three vast river systems no parallel? 61.
 What lake is over 12,000 feet above tidewater? 61.
 How does the rainfall differ from that of North America? 61.
 What is the character of the forests? 61.
 What is said of the coffee, rubber and wheat of South America? 62.
 Where are June, July and August the winter months? 239.
 Where is the Amazon 60 miles wide? 57.
 What river pours 52,000,000 cubic feet of water into the ocean every minute? 1501.
 What is the length of the coast line? 426.
 What is the only break in the western range of the Andes? 426.
 How do the rivers mostly flow? 426.
 What was the value of precious metals taken by Spain in three centuries? 426.
 What are the principal exports? 426.
 How long is the seaboard of Ecuador? 580.
 Where does it rain nearly all the year round? 580.
 What is the state religion? 580.
 Who are the merchants and landholders? 580.
 What place is famous for Panama hats? 580.
 What country has a lake whose surface is covered with pitch? 122.
 What is the character of the country of Venezuela? 2008.
 What links the Orinoco and the Amazon? 2008.
 What is the basis of Venezuela's wealth? 2009.
 The Inca Indians form what part of the population of Peru? 1456.
 How does the length of its coast compare with our Atlantic coast? 1456.
 Where is the most elevated tableland in the world, next to that of Tibet? 1457.
 How long does it take to travel from Lima to Iquitos? 1457.
 How does Bolivia compare in size and population with Illinois and Chicago? 238.
 What island was the home of the Incas? 238.
 What hinders the development of the mines? 239.
 Why is Chile called the shoestring republic? 386.
 What is the third largest city in South America? 387.
 What is the chief source of the nation's wealth? 387.
 Why are the houses of Santiago only one story high? 1676.
 The Argentine Republic is 22 times as big as what state? 94.
 What is the second largest river system in the world? 94.
 Where are the famous wheat fields? 94.
 Why will it be one of the great producing nations of the world? 94.
 How is Buenos Ayres connected with the U. S.? 285.
 What is one of the most fertile regions of South America? 1419.
 What is Paraguay tea? 1419.
 What is the temperature during the summer months of December January and February? 1419.
 How does Uruguay compare with Rhode Island in size? 1992.

What is the character of the country? 1992.
 Is Brazil as large as the United States? 261.
 What is the most remarkable system of waterways on our planet? 261.
 How does Brazil lead in variety of plants? 262.
 What is the language spoken? 262.
 Who pays the salaries of the Catholic prelates? 262.
 What are the five sections of Guiana? 811.
 How is British Guiana rich? 811.
 Where are the inhabitants gradually diminishing? 811.
 To what country do the Falkland islands belong? 648.
 Who is called the king of the penguins? 648.
 Why has Patagonia disappeared from the map? 1428.

EUROPE.

How does Europe rank in size compared with other continents? 632.
 How does it rank as to density of population? 633.
 How does Europe compare in size with the United States? 632.
 How is Europe divided physically? 632.
 What portion of the continent is classed as plains? 632.
 In what country is the highest summit? 632.
 What sea enters Europe from the Arctic Ocean? 632.
 What seas enter from the Atlantic Ocean? 632.
 How do the lakes in Europe compare in size with lakes in America and in Africa? 632.
 Which is the largest river of Europe? 632.
 What is the general climate of Europe? 633.
 Does the Gulf Stream affect the climate of western Europe? 633.
 What river of Europe contains a passage known as the Iron Gate? 502.
 Do certain winds affect the climate of Europe? 633.
 Is it probable that most of the fruits now grown in Europe are natives of the country? 633.
 To what races of people do the Europeans belong? 633.
 What is the prevailing religion in Europe? 633.
 What race track in Europe is said to be the most famous one in the world? 622.
 For what has the village of Interlaken, Switzerland, become famous? 932.
 What is the largest roof in Europe unsupported by pillars? 1408.
 What famous hunting grounds have recently been made one of the most beautiful pleasure grounds of Europe? 622.
 Where are the finest squares in Europe? 1954.
 What is the finest Egyptian museum in Europe? 1954.
 What is the most aristocratic watering place in Europe? 335.
 What substitute for coffee is used throughout Europe? 757.
 What is the largest military post on the Mediterranean Sea? 1923.
 What are the most celebrated tunnels in Europe? 1951.
 What is the oldest university of central Europe? 1987.
 What universities of Europe are on the German model? 1987.
 In what country of Europe is education most widely spread? 756.
 How many universities are there in Europe? 1987.
 For what was the university of Bologna especially celebrated? 1987.
 What is the only European nation not having compulsory military service? 108.
 What are the most famous objects of grandeur and beauty in the Alps? 55.
 What mountains are called the playground of Europe? 55.
 What city government controls the opera-houses, theaters and street railways? 283.
 Where is the highest inhabited spot in Europe? 634.
 What is the third largest city of Europe? 204.
 Which is the most thickly populated country in Europe? 195.
 Where are found the largest coal-fields of Europe? 756. 1926.

What is Europe's average population to the square mile? 633.
 Where is Pompeii? 1524.
 Why did the Phœnicians give the name to Europe? 632.
 What gives it such an extensive coast line? 632.
 Where are the two mountain systems? 632.
 What is the center of the mountain system in the south and west? 632.
 What waters nearly surround Europe? 632.
 What islands cluster around the mainland? 632.
 What are the largest rivers. 632.
 Where do the myrtle and the date-palm grow? 632.
 Where did the plants of southern Europe come from? 633.
 Name some of the wild animals of Europe? 633.
 What is the best method of classifying the races? 633.
 How many languages are spoken in Europe? 633.
 What geographical changes were made in Europe in the last century?
 635.
 What is the longest river of Europe? 2028.
 How is the Danube controlled? 503.
 Where is the most difficult passage of the Danube? 502.
 What is one of the most noted rivers in the world? 1606.
 What sea has long been one of the commercial highways of the
 world? 1360.
 What prevents the Mediterranean from evaporating away? 1198.
 How many railroad tunnels pierce the Alps? 55.
 Where is the Balkan peninsula? 161.

GREAT BRITAIN AND IRELAND.

What are the boundaries of Great Britain? 798.
 What is the greatest length of the kingdom? 798.
 Why is the geological formation of the country interesting? 798.
 What is the greatest natural wealth of Great Britain? 798.
 Why has Great Britain one of the healthiest climates in the world? 798.
 How much of the world's shipping is done by British vessels? 798.
 What countries compose the United Kingdom; what the British Em-
 pire? 799.
 What are the shape and size of England? 615.
 What makes its coast line so long? 615.
 How does it compare in size with New York state? 615.
 How much of its area is productive? 615.
 What are the yearly exports and imports? 615.
 When did agriculture represent half the wealth of the nation? 615.
 What port has one-third of the foreign trade of the whole kingdom?
 1103.
 What is the area of London? 1110.
 What makes London the wealthiest city in the world? 1111.
 What is the North Channel, the Irish Sea and St. George's Channel?
 937.
 What are the provinces of Ireland? 937.
 What is the size of Ireland? 937.
 What advance has the country made in recent years? 937.
 What makes Dublin one of the most beautiful capitals in Europe? 556.
 What is the Cove of Cork now called? 1574.
 How does Scotland compare with Indiana in size? 1707.
 Why are few places more than 40 miles from the sea? 1707.
 How long is the Clyde? 1708.
 How many mountain peaks above 3,000 feet? 1708.
 How do the cool summers affect agriculture? 1708.
 What is said of salmon in Scotland? 1708.
 What is the state religion? 1708.
 What is the source of Glasgow's prosperity? 772.
 Where is Fingal's Cave? 674.

FRANCE.

- How does France compare in size with Europe? 703.
 How long is its coast line? 703.
 What are its boundaries? 703.
 What is the length of its land frontier? 703.
 What is the character of the southeastern half of France? 703.
 What is the highest peak of the Cevennes Mountains? 703.
 What other mountain ranges in France? 704.
 What two widely different regions about the Cevennes Mountains? 703.
 What mountains separate France from Spain? 704.
 What famous tunnel leads into Italy? 704.
 What are the largest rivers? 704.
 What large island on the coast belongs to France? 704.
 What proportion of the people live in the country? 705.
 What is the high value of an acre of market-gardening ground? 705.
 What industries show the artistic taste of the people? 705.
 What rank does France hold in silk manufacture? 705.
 How is internal commerce carried on? 705.
 What university has 18,000 students attending? 706.

GERMAN EMPIRE.

- What is the one imperial province of Germany? 756.
 Where is the high tableland of Germany? 756.
 What is the highest peak in Germany? 756.
 What is the character of northern Germany? 756.
 What are the drainage basins? 756.
 How are the great river systems connected? 756.
 Where is the largest iron deposit in Europe? 756.
 Where is the largest coal-field in Europe? 756.
 Where is one-half of the world's zinc produced? 756.
 Name some other natural resources of Germany? 756.
 What is used as a substitute for coffee? 757.
 Where does the making of toys and wooden clocks flourish? 757.
 How much beer is brewed yearly? 757.
 What is the size of the German mercantile fleet? 757.
 How long must a German serve in the army? 757.
 Why are Germans called Dutchmen? 757.
 What is the density of population in Germany? 757.
 What are the largest cities of Germany? 757.
 What are the German colonies? 757.
 Where is the street called Unter den Linden? 204.
 What are the most beautiful gates of Munich? 1277.

AUSTRIA-HUNGARY.

- How does it compare in size with Texas? 144.
 What is the meaning of the name? 145.
 What mountains in Austria-Hungary? 145.
 How does the climate vary throughout the country? 145.
 What is the only mineral not found in this country? 145.
 Where are the richest lead-mines in Europe? 145.
 What mines were worked by the Celts and Romans? 145.
 How many people engage in tilling the soil? 145.
 Where is the granary of Europe? 145.
 For what animals is Hungary famous? 145.
 In what products does Austria lead? 145.
 What city leads Europe as a milling center? 145.
 How many grades of wheat are used? 145.
 Where are half the glass factories? 145.
 What does America buy and sell from Austria Hungary? 145.
 How long is the Danube's course? 145.
 What is the size of the merchant-marine? 145.
 How is most of the ocean freight transported? 146.

SPAIN AND PORTUGAL.

- What waters wash the coast of Spain? 1788.
 How is it separated from Africa and France? 1788.
 What islands on the coast belong to Spain? 1788.
 What is the area of Spain? 1788.
 How many rivers are there in Spain? 1788.
 Where are the richest quicksilver mines in Europe? 1788.
 What per cent. of the people are engaged in farming? 1788.
 What is the character of the Mediterranean shore? 1788.
 What is one of the principal exports? 1788.
 What are the chief cities of Spain? 1788.
 What are the length and breadth of Portugal? 1534.
 What is the total area with the Azores and Madeiras? 1534.
 How far are the Azores from Portugal? 149.
 For what has the island of Madeira long been noted? 1141.
 How does the population of Portugal increase? 1534.
 What is the most important mountain range in Portugal? 1534.
 What do the ocean breezes do for the climate? 1534.
 What is the condition of agriculture? 1534.
 What is port wine? 1534.
 Where are the manufactures located? 1534.
 What are the chief mineral products? 1534.
 How long must each male Portuguese serve in the army? 1534.
 Where is one of the oldest universities in Europe? 1534.
 Where was one of the greatest earthquakes on record? 1079.
 What city in Portugal has a crystal palace? 1387.

ITALY.

- How are the limits of Italy strongly defined? 946.
 What is the shape of the peninsula? 946.
 What is the character of northern Italy? 946.
 What are the great plains of Italy? 947.
 What mountain systems in Italy? 947.
 What are the most remarkable volcanoes? 947.
 Are the Italian rivers navigable? 947.
 What are the famous mountain lakes? 947.
 What noted marble comes from Italy? 947.
 What is the character of the people? 947.
 How many of the people are engaged in agriculture? 947.
 What are the main products? 947.
 What is the state religion? 947.
 How does the navy of Italy rank? 947.
 Why must Rome import all the necessities of life? 1630.
 What famous plant that once grew in Egypt now grows in Sicily? 1418.

RUSSIA.

- How large is the Russian Empire compared with the continent of Europe? 1645.
 European Russia is what part of the whole empire and contains what portion of the population? 1645.
 What ocean was the whole sea coast of Russia till the end of the seventeenth century? 1645.
 What sea coast is now of chief importance to Russia? 1645.
 What is the principal range of mountains? 1645.
 What large rivers flow north, and which flow south? 1645-6.
 How wide is the plain crossing central Russia? 1645.
 What two great rivers have been connected by a canal? 1646.
 What are the four chief cities of Russia? 1646.
 What races of people make up the population of Russia? 1646.
 What kind of a government has Russia? 1647.
 To how many boards is the administration of the empire intrusted, and what power has each board? 1647.
 The peasant class are what portion of the population? 1646.
 What minerals are found in Russia? 1646.

- What are the chief articles of export? 1646.
 What is a great help to the inland trade? 1646.
 What is the monetary value of manufactured products? 1646.
 What part of Siberia is very fertile and is the granary of the country? 1750.
 When was the trans-Siberian railroad opened? 1750.
 What is the climate of Siberia? 1750.
 How many degrees below zero has the thermometer been known to register? 1750.
 What town is called the Manchester of Poland? 1107.
 In what two continents does the Russian empire lie? 1645.
 What are the main divisions of Russia? 1645.
 What part of the land surface of the globe is Russia? 1645.
 What is the present seaboard of Russia? 1645.
 Where is one of the finest roadsteads in the world? 1645.
 Where are the chief Russian seaports? 1645.
 What does the Caspian sea furnish to Russia? 1645.
 What immense plain crosses European Russia? 1645.
 What rivers rise in this plain? 1645.
 What is the population of Russia? 1646.
 What are the five classes of the Russian people? 1646.
 What makes the wide diversity of climate? 1646.
 Where are the minerals found in Russia? 1646.
 How much of the land belongs to the peasants? 1646.
 How many miles of canalized rivers? 1646.
 What is the war-footing of the army? 1647.
 What was the extent of the former kingdom of Poland? 1512.
 What is the meaning of the word Finland? 674.
 What canal runs through granite rock in Finland? 675.
 Why is Caucasus called the mountain of languages? 353.
 What separates the Russian and English possessions in Asia? 1955.
 What is the coldest country in the world? 1749.
 What are the tundras of Siberia? 1750.
 How was the barrier of Lake Baikal overcome in building the Siberian railroad? 1751.
 What is the chief naval station of Russia in Siberia? 2026.

SCANDINAVIA.

- What countries belong to Denmark? 520.
 What are the boundaries of Denmark? 520.
 How does the skai damage the crops? 520.
 What is the commonest tree in Denmark? 520.
 What is the value of the fisheries? 520.
 How much good soil in Denmark, and how many farmers are there? 520.
 Are the Danes well-educated? 520.
 To what church must the king belong? 520.
 What separates Norway from Sweden? 1361.
 Who are the only inhabitants of the mountains? 1361.
 How does the Gulf Stream affect the climate? 1361.
 What is the main occupation of the people? 1361.
 What is the condition of the mineral wealth? 1361.
 What interesting establishment in Christiania? 395.
 What are the length and width of Sweden? 1854.
 Where are the timber-lands and good pasturage of Sweden? 1854.
 Where are the iron-mines and copper works located? 1854.
 How much of the surface do the lakes cover? 1854.
 How long between summer and winter? 1854.
 To what extent is grain raised? 1854.
 How much of the land is covered by forests? 1854.
 How do the soldiers pay for their support? 1854.
 What is the national religion of Sweden? 1854.

GREECE.

- What is the geographical location of Greece? 800.
 How are its provinces divided? 800.
 What is the area of Greece? 801.
 What mountains on the north separate it from the rest of Europe? 800.
 Name some of the islands which are formed by an extension of the mountains forming the northern boundary? 800.
 What can you say of the rivers, their size and direction? 800.
 To what race of people do the Greeks belong? 801.
 What are thought to have been the habits of the early Greek tribes? 801.
 From what direction is it thought that the early tribes entered Greece? 801.
 By what name did those early tribes call themselves? 801.
 By what name does Homer speak of the early tribes? 801.
 To what language is that of the Greeks closely allied? 801.
 What is the earliest account we have of the Greeks' religion? 801.
 What was the form of their worship? 801.
 What is the modern Greek church called? 801.
 How is the Greek church supported? 801.

TURKEY.

- What countries are comprised in the Ottoman Empire? 1955.
 What are the total area and population of these countries? 1955.
 What races make up the Turkish subjects? 1955.
 What are the largest salt lakes? 1956.
 What are the principal mountain ranges? 1956.
 What is the climate of the country? 1956.
 What flower is extensively cultivated? 1956.
 Are the resources of the country well-developed? 1956.
 What is the religion and law of Turkey? 1956.
 How is the sultan regarded, and how great is his power? 1956.
 To what extent is polygamy practiced? 1956.
 What attitude does the government take toward education? 1956.
 Who is the grand vizier? 1956.
 Who is the Sheikh-ul-Islam? 1956.
 Who is the present sultan? 1956.
 How many sultans have there been since the conquest of Constantinople? 1956.
 Of whom are military services required? 1956.

HOLLAND.

- Where is Holland situated? 878.
 Is Holland above or below the level of the sea? 878.
 For what double purpose are the canals used? 878.
 What double purpose is served by the dikes? 878.
 What are the chief agricultural industries? 879.
 What are its chief manufactures? 879.
 What has lately become an important item of manufacture? 879.
 In what has Amsterdam the largest trade in the world? 879.
 What city is the capital of Holland? 879.
 What island possessions has Holland in the East Indies? 879.
 In the West Indies? 879.
 What are the three largest cities in Holland, not including The Hague? 879.
 Who is the present ruler of Holland? 879.
 What is Holland's busiest port? 1637.

SWITZERLAND.

- Locate Switzerland. 1857.
 What is said of the surface of Switzerland? 1857.
 Which are the principal mountain chains, and what may be said of them? 1857.

GEOGRAPHY

Give the location and area of the plain of Switzerland. 1857.
What hill country lies to the east of this tableland and between what waters? 1857.
What are the main divisions of northern Switzerland? 1857.
Into what is the Alpine region divided? 1857.
By what rivers are the valleys of Switzerland drained? 1857.
By what are the higher mountains covered? 1857.
What is said of the glaciers? 1857.
Where is the lowest part of Switzerland? 1857.
What is said of the forests of Switzerland? 1857.
How are the trees, cut on the heights, conveyed to the valleys below? 1857.
What is the chief business of the people of Switzerland? 1857.
In what part of Switzerland is farming carried on? 1857.
Where are the manufactures chiefly carried on? 1857.
What is said of trade in Switzerland in proportion to population as compared with that of other European countries? 1857.
What are the chief imports? 1857. Exports? 1857.
How is Switzerland governed? 1857.
What is said of the Federal legislature of Switzerland? 1857.
By whom is the president of the republic elected? 1857.
By whom is most of the land owned? 1857.
What are the military requirements of Switzerland? 1857.
What languages are spoken in Switzerland? 1857.
What cities are the centers of the Protestant part of Switzerland? 1857.
What is the population of Switzerland? 1858.
Where does Catholicism prevail? 1857.
What are the educational requirements of Switzerland? 1857.
What is said of the higher and specialized schools? 1857.
What is said of the postoffices, railroads etc. of Switzerland? 1858.
Under whose control are they? 1858.
Name the chief towns of Switzerland. 1858.

ASIA.

How does the continent of Asia rank in size? 119.
What does the name mean? 119.
What portion of the land area of the world is in Asia? 119.
Which is the greatest mountain system of Asia? 119.
What portion of Asia's area is in its peninsulas? 119.
What three large peninsulas are in southern Asia? 119.
What sea bordering Asia on the southwest has become a highway of the first importance? 119.
What two great tablelands has Asia, and what is their location? 119.
What three inland bodies of water has Asia? 119.
What are the names of several of the larger rivers of Asia? 119.
What is the location of the islands relative to the southeastern coast? 119.
What are the chief productions of Asia? 119.
To how many different groups do the people of Asia belong? 119.
What important junction does Allahabad form? 51.
What city is surrounded by a mud wall 24 feet high? 237.

INDIA.

What five natural divisions has India? 918.
What large river systems has India? 918.
How many well-marked seasons has India, and what are they? 918.
Of the domesticated animals what ones do the work of agriculture? 918.
What domestic animals are held sacred? 918.
Of the wild beasts, which one is the most feared? 919.
What are the chief agricultural crops? 919.
What portion of the country is available for farming? 919.

GEOGRAPHY

- What European country has the greatest trade with India? 919.
Politically, India is a dependency of what nation? 919.
For purposes of administration, India is divided into how many great divisions? 919.
What is the occupation of two-thirds of the people? 919.
To what religion do most of the people belong? 919.
How early were modern missions established? 919.
What city of India is entered by metaled roads through thirteen gates? 1921-2.
What famous palace has made Delhi, India, noted? 517.
Why do the Hindoos refuse to kill the cobra? 417.

JAPAN.

- What is the wealth of Japan, and what is the national debt? 964.
How much of Japan's trade is carried on with the United States? 964.
What has made navigation safe? 964.
What is the mileage of the railways? 964.
How do the chief cities compare with Chicago, Milwaukee, San Francisco and New Orleans? 964.
What is said of cloisonne? 965.
Which industries are increasing, and which are decreasing? 965.
What country is under the protection of Japan? 1157.
What naturally impregnable naval station now belongs to Japan? 1529.

CHINESE EMPIRE.

- By what name do the natives call their kingdom? 389.
What provinces or divisions has the empire? 389.
What emperor, B. C., formed China from eight kingdoms into one great empire? 384.
What is the most extensive mountain range, and of what great mountain system is it a spur? 389.
How does this mountain range divide China? 389.
What is that portion of China between this range of mountains and the Great Wall called? 389.
Describe the earth covering most of this great plain. 389.
What part of China is called the granary of the nation? 389.
What two rivers are the largest in China? 389.
What name is given the river Ho because of its many floods? 389.
What canal joins the northern and southern parts of the empire, and when was it built? 389.
How long is the Great Wall? 389.
How does the emperor open the farming season, and how does the queen start the work among the silkworms? 390.
How long has the silkworm been cared for in China? 390.
What articles are used as food, not common in European countries? 390.
What is the great beverage? 390.
What are the best buildings seen? 390.
Has China's mineral wealth been developed? 390.
What manufactured article is superior to any made in the west? 390.
What two articles are the chief ones of export? 390.

AUSTRALIA.

- To what European power does Australia belong? 142.
What is the size of Australia? 142.
What ranges of mountains are found in Australia? 142.
What river is the only large one in Australia? 142.
What is the nature of a large part of the interior? 142.
Where is the lake district, and what are the four largest lakes? 142.
What is the general climate of Australia? 142.
Do the native people differ from those of other continents? 142.
What is the chief occupation of the natives? 142.
What is their sense of right and wrong? 142.
How many political divisions has Australia? 143.

- What new form of government went into effect the first day of this century? 143.
 What portion of the people are agriculturists? 143.
 What are some of the exports? 144.
 What city is the largest in Australia? 143.
 What city has a first class naval station? 144.
 Why was the Australian ballot system invented? 144.

AFRICA.

- What are the greatest length and the greatest width of this continent? 22.
 How is it joined to Asia on the northeast and separated from Europe on the northwest? 22.
 What seas surround Africa? 22.
 What is the northern end of the continent? 22.
 What mountains run parallel to the Mediterranean coast? 22.
 What have recent explorations determined about the Sahara desert? 22.
 What region south of the Sahara? 22.
 How is the southern end of the continent marked? 22.
 What are the great rivers of Africa? 23.
 What is the drainage area of the Nile? 23.
 Where are the great lakes of Africa found? 23.
 What is said of the climate of Africa? 23.
 What is the most fatal region for Europeans and Americans? 23.
 Where are the minerals found? 23.
 What animal has, it is said, never been domesticated? 23.
 Have they ever been domesticated? 604.
 What fly's bite is fatal to cattle? 23.
 Where are the Hottentots and the pygmies? 23.
 What states of Africa are more or less independent? 23.
 What nations have colonies in Africa? 24.
 What is the total area of the British colonies? 328.
 What is the principal harbor of Cape Colony? 328.
 What forms the watershed of the country? 328.
 How does the eastern part differ from the western part? 328.
 Why has the Cape long been known as a health resort? 328.
 Describe the immense reservoir that is used for irrigation. 328.
 What did the natives formerly use instead of tobacco? 328.
 What has become of the native animals? 328.
 What birds are found here? 328.
 How large is the Kimberly diamond mine? 329.
 What are the principal exports and imports? 329.
 How many miles of good roads and railroads in Cape Colony? 329.
 What are the chief towns? 329.
 What modern improvements in Cape Town? 330.
 How does the Transvaal compare with Arizona in size? 1937.
 What does the land of the Transvaal mainly consist of? 1937.
 What makes the climate dry? 1937.
 What is the character of the soil? 1937.
 What industry is supreme? 1938.
 What is the Orange River Colony? 1389.
 What is the occupation of the Basutos? 180.
 What are the products and imports of Natal? 1305.
 Where has asbestos been discovered? 2137.
 What is the Central Africa Protectorate? 24.
 Why was it founded? 1366.
 What are the five provinces of Uganda? 1964.
 What is killing off the people of Uganda? 1964.
 How many miles of postroads and railroads in Rhodesia? 1607.
 What are the products of Nigeria? 1349.
 What town has a fine and safe harbor? 1021.
 What three countries own Somaliland? 1780.

What country with 32 miles of coast extends inward 335 miles? 1920.
 What is the second longest river in the world? 1351.
 What lake forms the reservoir for the Congo River? 442.
 What country controls the trade of the Niger River? 1349.
 How much of the Zambezi River is navigable? 2129.
 Is Lake Victoria considered the source of the Nile? 2020.
 What is the Assuan Dam? 125.

EGYPT.

How far up the Nile does Egypt extend? 590.
 What is the main feature of the country? 590.
 What part of the country is called lower Egypt? 590.
 Into how many divisions is Egypt divided? 590.
 What peculiarity has the Nile valley with reference to rain? 590.
 At what season of the year does the Nile begin to rise? 590.
 How is the course of the river broken? 590.
 What are the chief agricultural crops of Egypt? 590.
 What fruits are found in Egypt? 590.
 What religion prevails in Egypt? 590.
 What three gods were found all over ancient Egypt? 590.
 For what purpose were the pyramids used? 591.

GEOLOGY

Who was the father of American geology? 1139.
 With what does the science of geology deal? 747.
 Why is the idea that geology deals with rocks only, inadequate? 747.
 In working out the history of the earth, what has been the line of approach? 747.
 How is the land carried away into the sea? 747.
 How are sandstone and shale then formed? 747.
 What is inferred from this? 747.
 From what other sources do geologists learn to interpret rock formations? 747.
 Where do geology and astronomy meet? 747.
 What is the rival to the nebular hypothesis? 747.
 What does it affirm? 747.
 What are the three great classes of rocks? 747.
 What are the three great agents in the metamorphism of rocks? 748.
 What does dynamic geology deal with? 748.
 What does petrography deal with? 748.
 How may structural geology be defined? 748.
 What does physiographic geology deal with? 748.
 With what other divisions of the subject is it connected? 748.
 What is dealt with in paleontologic geology? 748.
 Why is historic geology a broad phase of the subject? 748.
 Why is economic geology a practical phase of the subject? 748.
 What are the five eras of geologic time? 748.
 What was formed during the Archean era? 748.
 What formations were deposited during the Proterozoic era? 748.
 How long is this era supposed to have been? 748.
 What systems of rocks were deposited during the Paleozoic era? 748.
 How are these systems distinguished from one another? 749.
 How great was the range of life in the Cambrian period as compared with that of the present? 749.
 In what period have fish remains been found? 749.
 What period is known as the Age of Fishes? 749.
 During what period were the great coal deposits made? 749.
 When did reptilian life begin? 749.
 How is it known that the relations of sea and land differed at different times? 749.
 Does it appear that the deep sea bottom has ever been land? 749.
 What life existed in the Mesozoic era? 749.
 In what period of this era were reptiles the dominant type of life? 749.

What period do mammals date from? 749.
 In what period do remains of birds appear? 749.
 When were the chalk deposits made? 749.
 When did modern types of plants and fishes appear? 749.
 What is the Cenozoic era? 750.
 Why was the Pleistocene period remarkable? 750.
 Where were the ice sheets developed? 750.
 What various conjectures have been made concerning the age of the earth? 750.
 How are the ages of the various eras thought to compare? 750.
 What has been the character of the climatic changes? 750.
 What may be said as to volcanic activity? 750.

PALEONTOLOGY.

What does paleontology deal with? 1409.
 What are the three divisions of the science? 1409.
 Do all the systems of rocks contain fossils? 1409.
 What is it the province of paleontology to determine? 1409.
 What is involved in the first point? 1409.
 What is meant by cosmopolitan faunas and colonial faunas? 1410.
 What is involved in the second point? 1410.
 What does the third point consider? 1410.
 What would a complete knowledge of paleontology involve? 1410.
 How does paleontology aid in determining the age of rock formations? 1410.
 What is paleontologic geology? 1410.
 What is paleontologic zoology? 1410.
 What is paleontologic botany? 1410.
 Are all animals and plants of higher types than their ancestors? 1410.
 Is evolution ascent or differentiation? 1410.
 What is differentiation? 1410.
 Does the succession of fossils demonstrate the doctrine of evolution? 1410.
 Why is present knowledge of ancient life very far from complete? 1410.

HISTORY

EGYPT.

What was the condition of the Egyptians when they first became known in history? 591.
 What system of writing had they? 591.
 Why is the early history dated by dynasties? 591.
 Who founded the city of Memphis? 591.
 What marks the site of the ancient city today? 1202.
 What was the duration of the first dynasty? 591.
 Who built the pyramids of Ghizeh? 591.
 How many pyramids are there in Egypt? 1565.
 How large is the Sphinx? 1797.
 When did the shepherd-kings arise? 591.
 What famous Hebrew of Scripture was prime minister to one of these kings? 591.
 What is the capital of these kings called in the Bible? 906.
 How did the kings of Egypt get the name of Pharaohs? 1464.
 What are the most famous ruins in Egypt? 1898.
 Who raised Egypt to its highest point of glory? 591.
 What inscription did Rameses I have over his library door? 1063.
 Under what king did the Israelites depart out of Egypt? 1585.
 In what dynasty did Egypt come into touch with Greece and Judea? 591.
 Who planned the Suez Canal and conquered Palestine? 591.
 How was Moses reared? 1269.
 When was Egypt conquered by the Persians? 591.
 How did Cambyes die? 313.

- What was the condition of agriculture among the ancient Egyptians? 26.
- What system of writing had they? 591.
- What American people used the same kind of writing? 873.
- What sciences did the Egyptians know? 591.
- What is the proof of their engineering skill? 591.
- What mechanical tools were invented and used? 591.
- How was papyrus made 1418.
- What did it cost to embalm a body in ancient Egypt? 1277.
- Why did the Egyptians embalm their dead? 591.
- What were pyramids, obelisks and sphinxes used for? 591.
- What are "Cleopatra's Needles"? 1368.
- What animal was especially sacred among the Egyptians? 591.
- How was the key to their hieroglyphics first obtained? 1635.
- How did their artists always represent the king? 668.
- When was Alexandria founded? 591.
- How did Sostrates deceive the king who built the famous lighthouse? 45.
- What was the largest collection of books ever gathered before the invention of printing? 46.
- What battle marked the end of Cleopatra's reign? 591.
- Who placed Cleopatra on her throne? 408.
- When and by whom was Cairo founded? 591.
- How far are the pyramids from Cairo? 304.
- Who were the Mameluke kings? 1154.
- Who introduced the beginnings of European civilization? 592.
- Under what ruler was the Suez Canal cut? 592.
- What ruler suppressed the slavetrade? 592.
- Since when has England had a controlling influence in Egypt? 592.
- What was the unfortunate end of the brave Gen. Gordon? 592.
- What valorous general has reconquered Sudan? 592.
- When was Sudan declared open for general traffic? 1843.

BABYLONIA.

- What made Babylon the most fertile spot in Asia? 152.
- What did the Babylonians know of irrigation? 940.
- How have we gained our knowledge of ancient Babylon? 152.
- When did boys become free citizens? 152.
- What privileges did women enjoy? 152.
- How far back does Babylonian history go? 152.
- When did Babylon become the capital of the empire? 152.
- Who was one of the greatest of ancient monarchs? 1315.
- What people did he carry into captivity? 153.
- Why did the people revolt against Nabunaid? 153.
- When and by whom was Babylon captured? 153.
- How has Babylon been successively ruled? 153.
- How was the city of Babylon built? 152.
- What is the finest work in Babylonian literature? 1080.

ASSYRIA.

- How did we learn the history of Assyria? 1352.
- What description does Jonah give of the city of Ninevah? 1352.
- Who was the real founder of the first Assyrian Empire? 125.
- When did the empire decay? 125.
- What king again established the power of Assyria? 125.
- Who usurped the throne and what tax did he levy? 126.
- Who carried away 27,000 of the best citizens of Samaria? 126.
- Who was Assyria's greatest king? 126.
- How is Sennacherib mentioned in the Bible? 126.
- When did the kingdom reach its greatest height? 126.
- What present town is near the ruins of Ninevah? 126.
- From what place have many Babylonian records been shipped? 126.

What was the development of art in Assyria, Babylonia and Chaldea?
668.

Why were Assyrian boys educated at home? 1081.

THE HEBREWS.

How long have the Hebrews been called Jews? 971.

Where did the Hebrews first settle? 971.

How long did they remain in Egypt? 971.

When did Moses lead them out of Egypt? 971.

Under what leader did they enter the land of promise? 971.

How was the tribe of Levi provided for? 971.

What is the heroic age of Hebrew history? 972.

Who were the greatest of the 15 judges? 972.

Who were the greatest Hebrew kings? 972.

Who founded the lyric poetry of the Hebrews? 507.

What madness seized Saul? 1683.

Why was Solomon's reign a splendid failure? 972.

Who were the Samaritans? 972.

How long did the exile of the Jews last? 972.

What heroic family drove out the Syrians? 972.

What Roman captured Jerusalem? 972.

When did the Jews get the rights of Roman citizens? 972.

When was the temple at Jerusalem destroyed? 972.

What has been the history of the Jews since their dispersion? 973.

How are the Jews now distributed throughout the world? 973.

Who is placed next to Moses in Jewish literature? 1081.

Name some noted Jews in literature, science and public life? 1082.

How did the Jews divide the Scriptures? 209.

What saved the life of Josephus the Jewish historian? 979.

THE PHOENICIANS.

What was the extent of Phœnicia? 1473.

Where did the Phœnician settlers come from? 1722.

When did Sidon begin to take the lead? 1473.

Under what people did Sidon reach its greatest prosperity? 1753.

What did Hiram, king of Tyre, furnish to Solomon? 1963.

What colonies were founded by the Phœnicians? 342, 1473.

What is the origin of the English alphabet? 1722.

What were the two chief manufactures of Phœnicia? 773, 1473.

What did the Phœnicians know of mining and working metals? 1473.

What is the last period of Phœnician history? 1473.

What was the religion of the Phœnicians? 1473.

When did the last shadow of Phœnician independence pass away?
1473.

GREECE.

From what people did the ancient Greeks come? 801.

What were their character and occupation? 801.

How did they enter Greece? 801.

What did each succeeding tribe do to the ones that went before them?
801.

When did the Greeks found cities in Sicily? 1751.

What was the early form of government in Syracuse? 1861.

Where is Sparta located? 1792.

How were the citizens classed? 1792.

What did Lycurgus do for Sparta? 1792.

In whose honor was Athens named? 130.

How is Draco unjustly blamed? 548.

What did Solon make the title to citizenship? 1779.

What was Solon's purpose in doing this? 1779.

What was the ceremony of giving an oracle? 518.

Where were the Pythian games held? 1568.

When were the Olympic games abolished? 1381.

What Persian king made the first two wars against Greece? 504.

What was one of the decisive battles of the world? 1167.
 What Persian king made the third expedition against Greece? 2118.
 Who was one of the ten generals chosen to resist the Persian invasion of Attica? 1228.
 How many men escaped from the battle of Thermopylæ? 1901.
 Who led the fight at the pass? 1056.
 How did Themistocles win the battle of Salamis? 1664.
 What rival helped him to win this battle? 97.
 What other contest took place on the same day? 343.
 Why was Themistocles banished? 1899.
 Where was Mardonius, the Persian, defeated? 1502.
 When was the most brilliant epoch of Athens? 130.
 What made the age of Pericles glorious? 130.
 What was the dying statement of Pericles? 1453.
 What caused the Peloponnesian War? 1453.
 What people incited this war? 455.
 When was the Confederacy of Delos formed? 518.
 What is the earliest Greek literature we have? 1082.
 What closes classical Greek literature? 1082.
 What work of art illustrates a thousand years of Grecian history? 669.
 What ruined the Parthenon? 1426.
 Who built the Propylæa? 1465.
 Where and when was Herodotus born? 868.
 How did Socrates teach? 1777.
 Why did he marry Xantippe the famous scold? 1777.
 Why did Plato abandon poetry? 1502.
 What are the important works of Aristotle? 97.
 How did the drama arise in Greece? 550.
 What are the seven tragedies of Æschylus? 21.
 Who won the prize long held by Æschylus? 1781.
 What happened in Athens when Euripides died? 632.
 What heroic resistance did Platæa make to Sparta? 1501.
 Who was the first king of Macedon? 1135.
 Who was the father of Alexander the Great? 1135.
 At what age did Alexander take charge of his father's government? 44.
 What did Demosthenes do to stop the Macedonian conquest? 1899.
 How did Alexander avenge himself upon the citizens of Thebes? 1899.
 In what great battle did he defeat the Persians? 44.
 What were the conditions of surrender made by Alexander to Darius? 44.
 What disaster to Persia followed the battle of Arbela? 44.
 Who did Alexander say should inherit his throne? 44.
 When did the magnificent city of Persepolis disappear from history? 1455.
 In what year did Greece become a Roman province? 1135.
 What horde of barbarians ravaged Greece in 395 A.D.? 801.
 Who defeated the Bulgarians? 801.
 When did Greece pass into the hands of the Turks? 801.
 When did the war of independence break out in Greece? 801.
 What famous English poet fought with the Greeks in this war? 298.
 Who was elected king of the Hellenes in 1863? 801.
 Are the modern inhabitants of Greece descended from the ancient Greeks? 801.

ROME.

What is the legendary history of Romulus? 1631.
 What peoples were mingled to form the ancient Romans? 1626.
 What is the most rational view regarding the founding of Rome? 1626.
 What crime led to the founding of the republic? 1872.
 How have we learned the history of the Etruscans? 630.
 Who made Rome the acknowledged head of Latium? 1872.

- How did the Romans get Sabine wives? 1651.
 What final victory placed Rome in control of all Italy? 1627.
 When was Etruria admitted finally to the Roman empire? 630.
 What were the Punic wars and when did each break out? 1562.
 What did Rome gain by the first Punic war? 343.
 How many years did Hamilcar defy Rome? 830.
 What famous Carthaginian general fought during the second Punic war? 834.
 What terrible punishment was visited upon Carthage at the end of the third Punic war? 1707.
 What was the last battle Rome had with a civilized people? 1627.
 Who was Jugurtha (1365), and what general finished the war with him? 1172.
 In what city was the insurrection of slaves organized? 331.
 What famous slave raised an army of 100,000 men to fight Rome? 1792.
 What ended the servile war? 1525.
 How did the plebeians wrest the tribuneship from the patricians? 1941.
 Who let loose 4,000 slaves to kill the aristocrats of Rome? 1172.
 How did Sulla get rid of his enemies? 1845.
 What was the proud boast of Cornelia, the Roman matron? 789.
 At what famous battle was Pompey entirely overthrown? 303.
 How did Cæsar feel over Pompey's death? 1525.
 From what city did he send his famous message: "I came, I saw, I conquered"? 2031.
 Where does the modern title of Emperor come from? 303
 What month was named in honor of Cæsar? 303.
 What celebrated battle made Augustus master of the Roman world? 138.
 Why did the beautiful queen Cleopatra commit suicide? 409.
 What was the extent of the Roman empire at the death of Augustus? 1627.
 Who was the first emperor to lead the Roman legions in person? 1934.
 What emperor made a tour of the empire on foot to learn the needs of the provinces? 822.
 Who was the saintliest of pagans? 139.
 What new form of government did Diocletian give Rome? 533.
 How did the cross come to be the standard of the Roman soldiers? 447.
 Does Constantine's system of government exist anywhere today? 447.
 With what power did he endow Christianity? 447.
 What great general overthrew the Vandals? 2002.
 What was the end of the Roman empire? 1627.

EUROPE.

- What name is given to all ancient German races? 1895.
 What barbaric women killed themselves and their children at the battle of Verona? 399.
 Who were the Ostrogoths and the Visigoths? 784.
 What misfortune befell Rome by the putting to death of Stilicho? 37.
 What saved Europe from the Huns? 785.
 What were the character and manner of living of the Huns? 899.
 What remarkable meeting took place between Pope Leo and Attila? 899.
 How were the Goths converted to Christianity? 785.
 What is the value of Gothic in the study of Teutonic languages? 785.
 What important part in history is played by the monks of the middle ages? 1250.
 What was then the most important body of monks? 1250.
 What work was done by the Benedictine monks for literature? 1063.
 How did King Clovis become a Christian? 413.
 What monks brought Christianity into England? 616.
 What pope established our present calendar? 307.
 What English priest became the Apostle of Germany? 242.

- What religious order produced some of the greatest preachers and teachers of the middle ages? 543.
- What was the famous contest of investiture between Hildebrand and Henry IV? 804, 326, 812.
- What pope established Ash Wednesday observance? 119.
- To whom is the Catholic Church indebted for her ritual and chants? 804.
- Who first made the pope a temporal sovereign? 1450.
- When was the temporal power of the pope formally established? 1054.
- What were the ecumenical councils? 396.
- Who were the Black Friars of England? 543.
- Who Christianized the Saxon people? 368.
- What emperor set up schools throughout his country in the ninth century? 368.
- What people harassed England during the time of Alfred the Great? 48, 616.
- When did the Northmen first attack England? 1359.
- Who was the most illustrious of the Normans? 1360.
- Who was absolute owner of all the land under the feudal system? 658.
- How were the kings of Europe supported under the feudal system? 1875.
- Under whose dominion was the Holy Roman Empire? 634.
- Over what provinces did Henry II of Anjou reign? 634.
- Where were the Hungarians located? 634.
- How was half the population of Europe destroyed in 1348? 1499.
- Whose reign was known as the golden age of Portugal? 610.
- When did Portugal rank as one of the greatest monarchies of Europe? 1534.
- At the beginning of the sixteenth century what was the extent of the empire ruled by Charles V? 634.
- Who delivered Holland from the Spanish yoke? 879.
- When did the Thirty Years' War occur? 634.
- In what century was Sweden a great power? 634.
- When did Russia begin to make a steady growth? 634.
- At what time was Poland one of the most powerful states in Europe? 634.
- When did the duchy of Prussia become independent of Poland? 634.
- When did Russia begin to make a steady growth? 634.
- When did the French Revolution occur, and how did it affect the map of Europe? 634.
- After the fall of Napoleon's empire, how were the portions of Europe governed which now comprise Italy, Holland, Belgium, Germany and France? 634.
- What are the chief changes in Europe since the middle of the nineteenth century? 635.
- The early history of Europe is that of what three great empires? 633.
- What barbaric people were next to the Western Empire? 634.
- What people were next to the Eastern Empire? 634.
- How were the German barbarians divided? 634.
- Where was the home of the Slavs? 634.
- Where were the Gothic tribes found? 634.
- What people entered Britain when abandoned by the Roman garrisons? 634.
- What became the starting point of the kingdoms of France and of Germany? 634.
- What great empire began near the close of the eighth century? 634.
- What important victory had much to do in keeping Europe from becoming a Mohammedan country? 371.
- When did the Mohammedans establish themselves in Spain? 634.
- In what century was the Holy Roman Empire established? 634.

- Who was the first Roman to sail around England, proving it to be an island? 26.
- Almost every country of Europe was brought under the power of which pope? 927.
- Where is Thermopylæ Pass, and what made it famous? 1901.
- What was the Augustan age? 137.
- To what power does Iceland belong? 911.
- For what is the Dardanelles celebrated in ancient history? 503.
- What territory does the Ottoman Empire comprise? 1955.
- When did Servia first lose her independence, and when last gain it? 1726.
- What queen conquered Sweden, Lapland and Finland, and was afterwards called the Semiramis of the North? 1170.
- What victory of the eighteenth century prevented the invasion of England by the French? 1663.
- Who were the Turanians? 1952.
- What Albanian chief with fifteen thousand men defied the Sultan, who had an army of one hundred and fifty thousand? 1687.
- What caused Napoleon's defeat at Waterloo? 1301.
- What empire was much reduced in territory by the Treaty of Berlin? 205.
- What battle prevented the inferior nations of the East from destroying the civilization of the West? 135.
- When and where was the last battle fought by the Goths? 785.
- How long did the age of chivalry last? 1008.
- What was the condition of knighthood under the feudal system? 1007.
- What was the badge and what was the war-cry of the Crusaders? 483.
- What became of the children of the Children's Crusade? 483.
- Where is the oldest cathedral in Normandy? 184.
- What church did St. Augustine consecrate in England? 326.
- What is one of the finest specimens of Gothic architecture in Europe? 425.
- What church was built to enshrine the bones of St. Cuthbert? 563.
- What cathedral offers examples of all styles of Gothic architecture? 610.
- Where is the Augustinian monastery which once was the home of Martin Luther? 623.
- What dome served as a model for St. Peter's? 683.
- Where is the famous bell Great Peter? 774.
- What cathedral, begun in 1386, was finished by order of Napoleon? 1223.
- Where is one of the great towers of Italy? 1245.
- Where are the two cathedrals of Notre Dame in France? 1422, 149.
- How high is the belfry tower of St. Bavon's cathedral in Ghent? 763.
- What cathedral has a cedar crucifix dating from A. D. 782? 1122.
- How far back do the annals of Westminster Abbey go? 1111.
- What is one of the finest Byzantine churches from the period of Constantine? 93, 447.
- What is the highest church-spire in England? 1665.
- Where is a son of Columbus buried? 1729.
- What is one of the finest Gothic churches in Italy? 1753.
- FRANCE.
- Do the French emigrate largely? 706.
- Who was the earliest historian of France? 704.
- What was it called by that writer? 704.
- What was its condition when invaded by Cæsar? 704.
- What people succeeded the Romans in power? 704.
- What dynasty did Clovis found? 704.
- Who founded the Carlovingian dynasty? 704.
- Who was the real founder of the French monarchy? 704.
- What caused the enmity between France and England? 704.
- What was the Seventy Years' Captivity? 1467.

- What was the Salic Law? 704.
 What great battle was fought at Crécy? 476. At Poitiers? 1512. At Agincourt? 26.
 During what period did the Valois monarchs occupy the throne? 2000.
 What king was called the father of his people? 704.
 Under what king did the house of Guise become powerful? 704.
 What effect did the massacre of St. Bartholomew have upon the country? 704.
 Who was the first of the Bourbon princes? 704.
 What king first lived in the palace of the Tuilleries? 1949.
 Who caused the overthrow of the Huguenot party as a political power? 1612.
 In whose reign did France reach its highest point of luxury and power? 704.
 What did Colbert do for France? 420.
 Who were the two greatest generals during the civil wars? 1953.
 What wars were closed by the Treaty of Ryswick? 1650.
 What effect had the revocation of the Edict of Nantes? 704.
 Who abolished the compulsory labor of the poor on the public roads? 1954.
 When did the French Revolution break out? 704.
 What occasioned it? 717.
 What was the character of Louis XVI.? 717.
 When was the Bastille taken? 717.
 Who were the Girondists? 717.
 Who were the Montagnards? 717.
 What was the Jacobin Club? 955.
 Who led in the Reign of Terror? 717.
 What was the Commune of Paris? 434.
 What was the Directory? 533.
 When did Napoleon become consul of France? 278.
 What victory did Napoleon win at Marengo? 1169.
 When and by what means was Napoleon declared emperor? 705.
 How did Napoleon change the map of Europe? 705.
 When and where did Napoleon sign his act of abdication? 689.
 What general indirectly caused Napoleon's defeat at Waterloo? 807.
 Who was the last of the French kings? 705.
 Who was the first president of the new republic? 705.
 How did Napoleon III become emperor? 705.
 Who attempted to assassinate Napoleon III? 1395.
 Who was the first president of the republic after the Franco-German war? 705.
 Who succeeded Thiers as president? 1140.

GERMAN EMPIRE.

- What skillful leader did much to increase the power and influence of the empire? 759.
 By what emperor was Prince Bismarck deposed from the position of chancellor? 759.
 When was the first university founded in Germany? 760.
 How are the universities controlled? 760.
 What is Walpurgis Night, and what caused its origin in Germany? 2038.
 When do the Germans first appear in history? 758.
 What was their condition at the time of meeting the Roman armies? 758.
 What was the origin of the Goths, Franks and Saxons? 758.
 After the breaking up of the Roman Empire what kingdoms were formed by the Franks? 758.
 What noted person was the first of a succession of rulers that lasted over a thousand years? 758.
 How many nations were there in Germany at the time of Charlemagne's death? 758.

How did Henry III strengthen the empire? 758.
 When did the famous Frederick I reign? 758.
 How did the great monarch Frederick I. spend most of his time? 758.
 During the reign of Maximilian I what great reformer began preaching? 758.
 How did the Peasants' War and the Thirty Years' War affect the rural parts of Germany? 758.
 In 1702-13 what war brought glory to the German arms but was of no advantage to the country? 759.
 When did Frederick the Great come into prominence? 759.
 What was the condition of Germany during the time of Napoleon's power in Europe? 759.
 What combination did the free German states make after the fall of Napoleon? 759.
 What war occurred in 1866 for the leadership in Germany? 759.
 What part did the southern German states take in the war between France and Prussia? 759.
 What was the most important result of this war? 759.

HOLLAND.

When did the Frisians occupy what is now Holland? 879.
 In the eighth century they submitted to what ruler? 879.
 What Spanish ruler made the Netherlands a country of great importance? 879.
 Who delivered the Dutch from the Spanish yoke? 879.
 In what century was Holland one of the great powers of Europe? 879.
 By what country was her power crippled in the naval war of 1652-54? 879.
 What did William III of England do for Holland? 879.
 What century marks Holland's decay? 879.
 Who was made king of Holland in 1806? 879.
 When was Holland added to the French empire? 879.
 After the fall of Napoleon what kingdom was formed? 879.
 When did Belgium secede? 879.

ITALY.

Who was crowned king of Italy and emperor of Rome in 961 A. D.? 947.
 For how many years did the crown of Italy belong to the kingship of Germany? 947.
 What was the condition of the Italian kingdom while its foreign emperors were living beyond the Alps? 947.
 To what did Emperor Frederick Barbarossa agree in 1177? 947.
 How was Italy divided in the fourteenth and fifteenth centuries? 948.
 What century was the most disastrous in Italian history? 948.
 In the sixteenth century how was the papacy strengthened? 948.
 When did Napoleon conquer Italy? 948.
 What did the Congress of Vienna do for Italy in 1815? 948.
 Who were the leaders in the rebellion of 1848? 948.
 When did the emancipation of Italy become complete? 948.
 What did the pope retain? 948.
 When was King Humbert assassinated? 948.
 Who is the present ruler of Italy? 948.

SWITZERLAND.

What is said of the first inhabitants of Switzerland? 1858.
 When was Christianity adopted? 1858.
 Of what empire was Switzerland formerly a part? 1858.
 What caused the men of the forest cantons to begin war against Austria? 1858.
 What famous battle ended the Swiss struggles with Austria? 1858.
 By what means was other territory won by Switzerland? 1858.
 How did Zurich become a Protestant city? 1858.

Against whom was a religious war waged? 1858.
 Who was successful in this war? 1858.
 In what treaty did the European powers acknowledge the independence of Switzerland? 1858.
 By whom was Switzerland seized in 1798? 1858.
 When did it recover its freedom? 1858.
 What have the various cantons attempted to regain since they recovered their freedom from France? 1858.
 Who were the Free Corps? 1413. What was their purpose? 1413.
 What league did the Catholic cantons form? 1858.
 By whom was a successful war waged against the Catholic cantons? 1858.
 When was the present constitution chosen? 1858.

SPAIN.

Of what race do the Spanish nobles claim to be descendants? 785.
 What has made Seville one of the country's most famous cities? 1729.
 During what siege did women and children throw themselves into the fire while the men fought? 1654.
 What is the condition of the Alhambra to-day? 50.
 Who were the earliest visitors to Spain? 1788.
 What people made the first effort to occupy the country? 1788.
 What people were expelled by the Romans? 1788.
 When was the Roman conquest of the peninsula completed? 1788.
 By what name was Spain known to the Romans? 1788.
 When did Spain become the seat of a Gothic kingdom? 1788.
 How long did the Moorish kingdom in Spain last? 1788.
 When did it reach its highest prosperity? 1788.
 Who was the most powerful ruler? 1788.
 How were the different provinces united? 1789.
 What discovery raised Spain to a high place among European nations? 1789.
 How did Philip II become king of the country? 1467.
 How did he exhaust the strength of the country? 1789.
 For what purpose did he organize "the invincible Armada"? 1467.
 Under whose leadership was the Union of Utrecht formed? 1467.
 What part did Spain take in the Thirty Years' War, and with what result? 1789.
 Who was the first Bourbon king of Spain? 1789.
 What queen whom Carlyle called the termagant disturbed the peace of Europe for thirty years? 1469.
 What king did the people of the country refuse to recognize in 1808? 1789.
 What great naval battle was fought at Trafalgar? 1934.
 Who is the present king of Spain? 1789.
 What led to the Spanish-American war, and what was the result of this war? 1789.

SCANDINAVIA.

How far back does the history of Denmark go? 520.
 What country did Waldemar I conquer? 521.
 What was the character of Queen Margaret's rule? 521.
 How was Christian I chosen king? 521.
 Under whose rule was Sweden separated from Denmark? 521.
 When was Norway lost to Denmark? 521. To Sweden? 1855.
 With what other people is the history of this country associated? 1361.
 When was Norway attached to Sweden? 1361.
 When were titles of nobility abolished? 1361.
 Who is said to have first conquered the whole of Sweden? 1854.
 What were the Swedes in general doing at the time their history begins? 1854.
 Who was the first Christian king, and when was he baptized? 1854.
 When and under what ruler were the three Scandinavian countries united? 1854.

- How did the great general, Gustavus Adolphus, spend the greater part of his reign? 1854.
What acknowledgement did Charles XI win from the diet? 1855.
How did Charles XII make his power felt in Europe, and what was the effect in his own country? 1855.
What acknowledgment did Charles XI win from the diet? 1855.
Who was Charles XIV? 1855.
What is the most celebrated cathedral in Sweden? 1991.
What is known as the blood-bath of Stockholm? 1828.

RUSSIA.

- From what direction did the Russian Slavs enter Russia? 1647.
When was the first written law compiled? 1647.
What kind of government was established in the towns and colonies founded as the Slavs steadily moved eastward? 1647.
What did Prince Andrei Bogalubski do? 1647.
What people conquered the Russians in 1224? 1647.
What effect did the Mongol conquest have upon the civilization of the country? 1647.
When did Russia first try to throw off the Mongol yoke? 1647-8.
What Russian prince succeeded in defeating the Mongols and freeing Russia? 1648.
Who was the first to take the title of tsar? 1648.
What order of Regent Boris Godunoff sowed the seed of serfdom? 1648.
Under Alexis, the Russians gained the upper hand of what rival power? 1648.
What improvements did Peter the Great make? 1648.
What officers were the real rulers under Catherine I and Peter II? 1648.
Under whose reign occurred the first partition of Poland and the widening of Russia's domain? 1648.
Under whose reign was Russia invaded by the French and the city of Moscow burned? 1648.
What did Alexander II do for the serfs? 1648.
Have the mines of Siberia been developed? 1750.
What name was given to the earliest inhabitants? 1750.
What people conquered the country in the eleventh century? 1750.
What class of Russians were the first to invade Siberia? 1750.
When was Russian possession of Siberia acknowledged by China? 1750.
When does the history of Poland begin? 1513.
From the reign of Mieczyslaw, how long did Poland continue as an independent power? 1513.
When did the first partition of Poland take place? 1513.
What countries combined for the dismemberment of Poland? 1513.
Where was Kosciusko defeated and made a prisoner? 1513.
What were the conditions that led to the downfall of Poland? 1513.
What action was taken against the Jews by Alexander III? 1648.
Of recent years does Russia seem to be progressing? 1648.

TURKEY.

- Of what empire is the Ottoman Empire the successor? 483.
Who was its founder? 483.
What sultan conquered Constantinople and when? 1956.
What sultan raised Turkey to its highest military power? 1956.
Who was called the Magnificent? 1956.
What was the result of the battle of Lepanto? 1056.
What generals reduced the Turkish power in Europe? 1956.
What general conquered Egypt? 1956.
Who were the janizaries? 960.
How did Mahmud II rid his empire of them? 960.
What troops have taken their place? 960.

What was the result of the battle of Navarino? 1956.
 In what year did Greece become independent? 1956.
 When was Turkey admitted into the political system of European states? 1956.
 What caused the Russo-Turkish war? 1956, 1957.
 How did this war change the map of European Turkey? 1957.
 What was the cause of the Armenian massacres? 1957.
 When did they occur? 1957.
 What was the extent of their design and how far was this accomplished? 1957.
 What is the largest city? 1957.
 What city contained three thousand statues, including the wonderful Helios? 1607.

JAPAN.

Who is the Japanese Bismarck? 960.
 How many small islands in Japan? 961.
 What is the population of Japan? 961.
 What kinds of wood are grown in Japan? 961.
 What makes the coast look like a Japanese screen? 961.
 What is the character of a large percentage of the country? 961.
 Do Japanese babies cry? 961.
 How do the Japanese dress? 961.
 What are the houses built of? 961.
 What gives Japan a holiday air? 961.
 What happens at cherry-blossom time in April? 962.
 What are the two religions of Japan? 962.
 When did St. Francis Xavier introduce Christianity. 962.
 When did true historic records begin to be kept? 962.
 What made Japan a hermit empire? 962.
 When did the Dutch and Portuguese trade with Nagasaki? 962.
 What did Commodore Perry demand in 1854? 962.
 What singular distinction belongs to Mutsuhito? 1292.
 Who told the powers they had been hoaxed? 962, 1293.
 What dramatic changes mark the seven decades of Mutsuhito's life? 1293.
 What is the Era of Enlightened Peace? 963.
 What did the daring young nobles do in the 50's? 963.
 How did the boy-emperor instruct the Japanese representatives? 963
 What are the five orders of the new nobility? 963.
 After what model was the army organized? 963.
 What countries were imitated in the navy? 963.
 What countries furnished the pattern for the constitution? 963
 When was Port Arthur fired on? 964.
 Where was the first great modern naval battle? 964.
 Who helped to end the Russo-Japan war? 964.
 How big is Tokyo? 964.
 What trouble arose in San Francisco in 1906? 964.
 What arts are declining in Japan? 965.

CHINESE EMPIRE.

How many years back do the annals of China extend? 390.
 China as an empire dates from what year? 390.
 In what year did the present dynasty begin to reign? 390.
 What two personages are always found in China, no matter how far back you go? 390.
 Whose death in 1405 saved the independence of China? 3914.
 From what has the custom grown, since the seventh century, that all officers of the government must be educated? 390.
 What are the three religions of China? 390-1.
 What is the characteristic of each religion? 390.
 Of what does the government power of the empire consist? 391.
 At what hour of the day does the Grand Cabinet meet? 391.

In what year did European nations begin to trade with China? 391.
 What caused the war with England in 1840? 391.
 When and by whom was the first treaty made between China and the United States? 391.
 When did the present emperor come to the throne? 391.
 What was the cause of the war with Japan in 1894? 391.
 What was the result of the war with Japan in regard to Chinese territory? 391.
 When did the Boxer rising occur? 254.
 Who was the instigator of the Boxer rising? 254.
 How long were the foreign legations besieged in Pekin? 264.
 The representatives of what foreign nations were murdered? 264.
 How many persons were killed in defending the legations? 264.
 What indemnity was demanded of China by the foreign nations? 264.

GREAT BRITAIN AND IRELAND.

Did the cave-men own domestic animals? 353.
 Where did the Celts first make their home? 520.
 Why are the Celts said to be one of the oldest distinct races in the world? 116.
 What was the nature of these primitive people? 116.
 What are the purely Celtic people? 357.
 Did these ancient people believe in God and a future life? 554.
 What were their bards, prophets and priests called? 554.
 What was the most numerous and powerful of the British tribes? 2123.
 What is one of the most ancient of British cities? 2123.
 Who was the first Roman to invade Britain? 303.
 Did the Romans conquer Wales? 2034.
 What Roman general spent seven years conquering the island? 26.
 What "warrior queen" slew 70,000 Roman soldiers for injuring her people? 232.
 What Roman emperor died in England? 2123.
 What three tribes conquered Britain after the Romans left? 73.
 Why was Britain called England? 73.
 What is the meaning of Heptarchy? 73.
 Is the English language like the Anglo-Saxon tongue? 1088, 73.
 What terrible foes were driven from Wessex by Alfred the Great? 48.
 How did he spend the years of peace that followed? 48.
 How did the Danish king Canute get possession of England? 583.
 What was the noble character of Canute? 328.
 What religious difference was there between Canute and his grandfather? 521.
 From what countries came the Celts, Angles, Saxons, Jutes, Danes and Normans? 520, 1687.
 What marriage led to the introduction of Christianity? 616.
 What monk made King Edgar's reign the most prosperous in early history? 562.
 What great Englishman helped Edward the Confessor to restore the Saxon line? 776.
 When was the battle of Hastings fought? 2085.
 What has the battlefield been called ever since? 847.
 When was feudalism brought into England? 616.
 Why did William the Conqueror invade England? 2085.
 How did he avenge a sarcastic remark about his fatness? 2086.
 How did William meet his death? 2086.
 What price did William Rufus pay for Normandy? 2086.
 Which of the Conqueror's sons was known as the Lion of Justice? 862.
 Which one was a crusader? 483.
 What was the condition of a serf? 1765.
 What form of serfdom remained in Scotland until about 1800? 1766.
 What ancient people played the bagpipe? 157.
 Who was the wife of Geoffrey Plantagenet? 862.

- Name the Plantagenet kings? 1501.
 What angry remark led to the death of Thomas à Becket? 189.
 What were the Constitutions of Clarendon? 189.
 How did Richard the Lion-Heart spend the greater part of his reign? 1610.
 How was King John Lackland disgraced? 616.
 How were the Englishmen benefited by the Magna Charta? 1145.
 Whom do the English people call St. Simon? 1257.
 What king is known as the English Justinian? 586.
 When were all Jews driven from England? 586.
 Upon what great principle of justice was the House of Parliament founded? 616.
 What did Edward I do for John Balliol, the Scotch king? 586.
 What king was cast into prison by his wife? 586.
 Who led the Scots in the historic battle of Bannockburn? 586.
 What relic of this battle is shown today in Scotland? 170.
 What king was for many years an outlaw in his own kingdom? 278.
 What war helped to free the lowest orders from serfdom (616) and permanently changed the relations of master and laborer? 587.
 Did the famous Black Prince ever become king of England? 587.
 When were cannon first used by the English? 476.
 Why did Edward II send his uncle on a wild expedition into Spain? 974.
 What happened to Richard II upon his return from an expedition to Ireland? 1611.
 What put an end to the Wars of the Roses? 249, 587.
 What great queen spent 20 years in war and 4 in prison? 1170.
 How did Edward IV get the money he needed? 587.
 How did Richard III suffer for his numerous crimes? 1611.
 What brewer became the father of a line of English kings? 1949.
 How did the first Tudor king reunite the red and white Roses? 863.
 What admirable qualities had Henry VIII during the first half of his reign? 863.
 Who was Catherine of Aragon? 350.
 What honorable title was bestowed on Henry VIII by Pope Leo X? 863.
 What suggestion did Cranmer make to ease the mind of Henry VIII? 474.
 What ruined the reign of Mary Tudor? 1180.
 Who is called the Morning-Star of the Reformation? 2114.
 When did England become a world power? 607.
 What was the dismal end of the Spanish Armada? 103.
 What are the great blots on the reign of Queen Elizabeth? 607.
 What right had Mary Queen of Scots to the throne of Elizabeth? 1181.
 What great poet made the reign of Elizabeth illustrious for all time? 1089.
 When did Parliament allow English to be spoken in the law-courts? 618.
 Who was called the wisest fool in Christendom? 957.
 What caused the struggle between Parliament and Charles I? 368.
 What did the nicknames Roundhead and Cavalier mean? 353.
 Did Cromwell's government benefit the people of England? 481.
 How did Cromwell treat the Irish? 937.
 When was Cromwell made Protector? 171.
 Why is William III called the first parliamentary king? 617.
 When did the present reigning dynasty of England come to the throne? 617.
 When was the society of Orangemen formed? 1388.
 When were the king and queen of England both crowned sovereigns? 2086.
 What celebrated queen was the mother of 17 children? 75.
 Who are the peers of England? 1424.
 When was Sir Robert Walpole actual ruler of England? 2038, 751.
 Describe the South-Sea Bubble. 1787.

Who is the prime minister of England? 300.
 What eminent statesman was prime minister to George III? 751.
 What caused him to lose the American colonies? 751.
 When did the British East India Company settle in India? 920.
 What victory fastened England's rule upon Bengal? 411.
 When were the exclusive privileges taken away from the East India Company? 576.
 What famous trial of seven years was held over East Indian affairs? 847.
 How did the Seven Years' War affect the American colonies? 1727.
 What famous general was known as the Iron Duke? 2067.
 When was the 3rd of Sept. changed to the 14th, to the consternation of ignorant people? 307.
 What was the Manchester Anti-Cornlaw League? 416.
 Why was Victoria the most constitutional monarch of England? 2019.
 What did the great reform-bill do for the English people? 617.
 What brought an end to the Crimean War? 478, 1716.
 When did the Indian Mutiny occur? 354.
 What famous general was born at Cawnpore? 1619.
 How did Queen Victoria become endeared to the American people? 2019.
 What war cost England \$937,000,000 in four years? 235.
 What immense service did "Little Bobs" render his country? 1619.

AMERICA.

Who recommended Columbus to Queen Isabella? 431.
 Which of the West Indies is said to have been first discovered? 157, 2070.
 How is the Duke of Veragua related to Columbus? 431.
 Was Columbus the first to believe that the earth is a sphere? 745.
 What famous maker of maps first showed that America is a new continent? 301.
 What did the Filipinos do to Magellan on the first voyage around the globe? 1144.
 What letter to a school-friend caused America to be named? 2016.
 Did the man who discovered the Pacific name it? 1407.
 Where did the American Indians come from? 60, 921.

MEXICO.

When did the Toltecs come to Mexico? 1216.
 Who invented the Mexican calendar? 1216.
 Who was Aztlan? 150.
 What broke the heart of the last Aztec emperor? 1257.
 How were the Aztec women educated? 150.
 Where are some Aztecs living today? 1668.
 Where did Cortes burn his ships? 462.
 Was Cortes a common adventurer? 462.
 What is one of the romances of history? 1216.
 How are the records of the Aztecs preserved? 150.
 How did the Spaniards treat the native Mexicans? 1216.
 What did New Spain include? 1216.
 How did the priest Hidalgo serve his countrymen? 1216.
 Who established the Mexican republic? 1216.
 Under what incompetent monarch did Spain lose Mexico? 656.
 What is the character of Emperor Augustine I? 949.
 What relation had the Mexican states to the central government? 1675.
 Under what president was war again declared? 1216.
 Where did Maximilian make his last stand? 1574.
 How did he directly cause his own death? 1192.
 What was the pathetic fate of his loyal queen? 1192.
 What faithful general was executed with him? 1239.
 Who is the ablest of Mexican rulers? 1216.

Of what nationality is the higher class? 1216.
 What man's life offers no parallel in history? 528.
 At what age did Diaz walk 250 miles to enlist? 528.
 Why is Diaz called the perpetual president? 528.
 What is the salary of Diaz? 529.
 Where is his home? 367.
 What great emperor is compared with Diaz? 529.
 What were the parents of President Juarez? 981.
 When did he take over the government? 981.
 When was his government recognized by the United States? 981.
 When did Santa Anna become president? 1675.
 In what army did he serve against his country? 1675.
 How did he cause the loss of Texas? 1675.
 What battle did he lose to Gen. Sam Houston? 1673.
 When was he told to leave the country? 1675.
 What is one of the most prosperous manufacturing towns in Mexico? 1256.
 What did Las Casas do for the native Indians? 344.
 What people founded the City of Mexico? 1213.
 What lineal descendant of the ancient emperors wrote a complete history of Mexico? 951.
 What is the holiest shrine in Mexico? 1214.

CANADA.

Who visited Newfoundland five years after Columbus discovered America? 1341.
 How did the West-of-England fishermen conceal their profitable voyages? 1341.
 What character had the Newfoundland colonists? 1341.
 What brilliant English victory of the Seven Years' War was gained here? 1341.
 When was the first civil governor appointed? 1341.
 What remarkable resemblance does Newfoundland bear to the British Isles? 1342.
 How did the first railroad benefit Newfoundland? 1341.
 From what part of England did the early settlers come? 263.
 Is Newfoundland a part of the Dominion of Canada? 269, 320.
 Who discovered the mainland of Canada? 343.
 What name did the French give to Nova Scotia? 6.
 What part of the population is Acadian? 6.
 What splendid schools and colleges flourish in Nova Scotia? 1363.
 What great king reigned in England when Nova Scotia was discovered? 319, 863.
 Why did the Indians call Halifax Chebucto? 827.
 In what famous treaty was Nova Scotia acknowledged to be British territory? 319.
 Tell some interesting facts about that famous Englishman who founded the Hudson Bay Company. 1644.
 What was the extent of its territory? 893.
 Who was the last resident governor of the Hudson Bay Company? 1836.
 What was the first white settlement in Manitoba? 1159.
 From what country did these settlers come? 1159.
 When did Manitoba become part of the Canadian federation? 1159.
 Near what fort did the village of Winnipeg grow up? 2095.
 What has made Alberta famous? 307.
 What caused the Red River Rebellion? 1596.
 What was the fate of the leader? 1613.
 What archbishop induced the rebels to lay down their arms? 1596.
 Who commanded the Red River expedition? 2103.
 What foolish act of a mob gave William Lyon MacKenzie increased influence? 1138.

- Who was the only Canadian refugee to whom an amnesty was refused for rebellion? 563, 1138.
- What caused the rebellion of 1837? 1385.
- What Canadian premier took part in this rebellion? 343.
- What has caused the mistaken impression of Canadian climate held by Europeans? 1966.
- What name did Cartier give to the Indian village of Hochelaga? 343.
- What is the commercial metropolis of all British America? 1285.
- Where did the French missionaries and traders start from on their daring expeditions? 1572.
- What are some points of interest in the most historic city of Canada? 1573.
- How did France lose Canada? 1117.
- What great war led to the Treaty of Paris? 1728.
- What struggle increased the British possessions in America twenty-fold? 716.
- How did George Washington help England to gain Canada? 714.
- What great Canadian missionary was sent by Frontenac to explore the Mississippi? 1175.
- How did Joliet lose all his maps and papers on this voyage? 977.
- What large island is owned by Menier, the French chocolate-manufacturer 80.
- What caused the assassination of that romantic hero, La Salle? 1033.
- What Franciscan explorer sailed with La Salle? 861.
- Who was Henri de Tonti? 1923.
- What was the dying tribute Montcalm paid to his noble English conqueror? 2103, 1255.
- What memorable battle wrested supremacy from the French? 4.
- Who was the first Roman Catholic bishop of Quebec? 1037.
- What is a proof the the broadmindedness of the British government? 1037.
- Who is Quebec's most honored citizen? 1036.
- What distinguished citizen of Quebec endowed a magnificent agricultural school? 1573.
- What great university was founded in 1811? 1136.
- What Canadian educator stands in the first rank of American thinkers? 1189, 1037.
- What great French pioneer was loved by the wild people of the forest, by courtiers and close-fisted merchants? 366.
- What island is a paradise for summer tourists? 1547.
- How could the Indians get to any part of New Brunswick? 1324.
- What splendid park is a paradise for campers? 50.
- When did the actual career of Ontario begin? 1384.
- When did the Fenians invade Canada? 655.
- What splendid agricultural college in Ontario? 810, 1228.
- What governments closely approach civic perfection? 1385.
- What large city is supplied with electric power from Niagara Falls? 1924.
- What department-store employs 4,000 hands? 1924.
- Where is the residence of the governor-general of Canada? 1400.
- What improvements have been made in the St. Lawrence channel since 1857? 1659.
- What building is architecturally one of the most imposing on the continent? 1924.
- What part of Toronto University was founded by the Basilian Fathers? 1661.
- What college sent out the first missionaries for the Church of England in Canada? 2115.
- What noble count changed the course of New World history? 720.
- On what historic ground did he camp 234 years ago? 1005.
- How is Niagara illuminated? 1345.
- What was Anthony Trollope's tribute to Niagara Falls? 1346.

- What naturalist discovered the lowest form of animal life? 509.
 What dispute was jokingly called the Aroostook war? 111.
 Who discovered the Klondyke goldmines? 1007.
 What celebrated dispute did this reopen between Canada and the United States? 38.
 What is Sir Wilfrid Laurier's patriotic hope for the future of Canada? 1036.
 What Irish representative to the British Parliament was once leader of the Liberals in Canada? 225.
 Upon what Indian reserves was built the first church (Episcopalian) in Upper Canada? 260.
 What Indian chief translated *The Gospel of Mark* and *The English Prayerbook* into Mohawk? 260.
 Where was the first large suspension-bridge built? 266.
 For how long is copyright granted in Canada? 453.
 How many times have Fenians invaded Canada? 655.
 What Canadian statesman was governor of the Windward Islands and later of British Guiana? 875.
 What indemnity did the Hudson Bay Company receive for its rights? 893.
 Where is left a remnant of the Huron Indians? 900.
 What Canadian statesman was offered a knighthood three times but declined? 1137.
 When was use first made of power at Niagara? 1346.
 When was work first begun at Niagara to develop electric power? 1346.
 What Anglo-Canadian novelist is a member of the British Parliament? 1423.
 What Indian chief was a brigadier-general in the War of 1812? 1879.
 What Indian put off his uniform and sword and dressed like an Indian because he believed he would be killed in battle? 1880.
 By whom was Vancouver founded? 2001.
 How do the Huron Indians tell the story of their origin? 900.
 Where was the first modern cantilever bridge built? 267.

UNITED STATES.

- How should United States history be studied? 1977.
 How did Queen Elizabeth playfully name Sir Walter Raleigh's instability of character? 1584.
 When did Raleigh say: "This is a sharp medicine, but it is a sure cure for all diseases"? 1584.
 How did Raleigh honor his queen? 2024.
 The land of what great city was bought for beads, brass ornaments and bright cloth? 1336.
 What celebrated Virginian named New England? 1149.
 Where is Plymouth Rock preserved upon which the Pilgrim Fathers landed? 1507.
 What is the first written constitution we have any historical account of? 1490.
 What caused the first battle between Englishmen in America? 1182.
 When was the Mississippi River the western boundary of Virginia? 2024.
 Why is Connecticut called the Constitution State? 444.
 Who was exiled for saying the government should not control religion? 2088.
 Who was the first Chief Tammany? 517.
 To what rebellion can the Revolution be traced? 154.
 What six great colleges were founded before 1700? 1977.
 What dispute was settled by the celebrated Mason-and-Dixon line? 1184, 1448.
 What fortress, taken and destroyed by the New Englanders, cost \$5,000,000, and was 30 years in building? 1118, 1977.

- When did the Continental Congress make this noble declaration: "Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall be forever encouraged"? 1375.
- Where was Washington initiated into the business of war? 1496.
- Why did he think Providence had preserved him for some great duty? 2048.
- What explorations were carried on by Jesuit missionaries? 714.
- What important mission was entrusted to Washington when he was only 21? 714.
- What war prepared the colonists for the War of Independence? 1977.
- At what meeting in 1754 did Benjamin Franklin suggest the idea of uniting the colonies? 39.
- What noted Indian fighter had the first white child in Kentucky, and performed the first marriage ceremony? 245.
- What governor forced women to wear veils at all public assemblies? 614.
- Who were the first Puritans? 1564.
- Tell some of the adventures of Captain John Smith? 1770.
- What was one of the direct causes of the American Revolution? 1978.
- Upon what great principle of justice was Parliament itself founded? 616.
- What eminent English statesman made one of his greatest speeches in favor of the colonists? 1803, 1496.
- Where was the first regular newspaper published? 243, 1343.
- What was the original name of *The Saturday Evening Post*, founded by Franklin at 23? 708.
- Where did the first colonial Congress meet? 442.
- What was the Continental Congress? 443, 1978.
- When did the first Congress of the United States meet? 443.
- Whose portrait was on the first United States postage-stamp? 1809.
- What postage-stamp is worth \$375? 1809.
- Who was the first successful postmaster-general? 1536.
- When was letter-postage reduced to two cents an ounce? 1536.
- When did one cent and two cent postal cards come into use? 1537.
- How many million pieces of mail go to the Dead Letter Office per year? 510.
- What prophetic words were inscribed on Liberty Bell 23 years before the signing of the Declaration of Independence? 513.
- At what battle did the political existence of the United States begin? 1978.
- What celebrated strategy proved the turning point of the war? 1978.
- How did the famous Ordinance of 1787 help to bring about the Federal Union? 1979.
- When was the city of Washington made the capital of the nation? 2087, 1980.
- What president first occupied the White House? 2047.
- What fourteen masters did George Washington have to serve? 2049.
- What high place did Frederick the Great give to General Washington? 2049.
- Who uttered this celebrated tribute to Washington: "First in war, first in peace and first in the hearts of his countrymen"? 2049.
- What president more than doubled the area of the United States? 1980.
- What president was called the sage of Monticello? 963.
- What brave little woman guided the celebrated Lewis and Clark Expedition? 1061.
- How did Jefferson almost cripple New England? 611.
- When did the idea of states' rights first become prominent? 1814.
- Why was the Hartford Convention accused of treasonable designs? 846.
- What famous Indian was an English brigadier-general? 1879, 1876.
- In what administration did the president belong to one party and the vice-president to another? 1520.

- What two brilliant orators have been defeated three times for the presidency? 280, 407.
- What are the words of the Monroe doctrine? 1253.
- Who were the National Republicans? 2075.
- When did the Democrats and Republicans form one political party? 623.
- What sarcastic name was given to the Compromise Bill of 1850? 1382, 438.
- What was the Missouri compromise? 1242, 407.
- What was intended by the Wilmot proviso? 546.
- What did "squatter sovereignty" mean? 1981, 546.
- Who was the author of the Nullification Act that Jackson called treason? 308, 1785, 852.
- How did Texas avenge the death of David Crockett and his heroic comrades, 479, 36, 1673.
- What was the first great blow delivered to states' rights? 2063, 836.
- What laws protected the kidnapers of free negroes and forced these again into slavery? 722.
- What was the Gadsden purchase? 728, 100.
- What territory was discovered by an Italian friar and an African slave? 100.
- What Indians live in immense apartment-houses five stories high? 1559.
- Are the cliff-dwellers the same as cave-men? 100, 353.
- What is the Urim and Thummim of the Mormons? 1263, 1992.
- What conflict did the Mormons have with the Federal government? 1995.
- Who invented the Macintosh coat? 1640.
- Name six remarkable inventions that appeared between 1830 and 1850? 1981.
- Who were the Underground Railroad "conductors" for fugitive slaves? 1966.
- What was the memorable Dred-Scott case? 1869.
- What chief justice decided that slaves were not "persons" but "property"? 1982.
- What state declared that it might annul the laws of Congress? 1785.
- What colony first raised a military force to oppose English government? 1785.
- What state was the leading exponent of states' rights? 1785.
- What state was the first to secede before the Civil War? 441.
- How has the state been saved from the ignorant negro voters? 1785.
- How were the Confederate troops outnumbered in the Civil War? 1982.
- How many men were killed in the draft-riots in New York city? 548.
- What general was dismissed from the army after the Battle of Bull Run? 1531, 288.
- What great battle decided the Civil War? 762.
- After what desperate battle did Grant write his famous message: "I will fight it out on this line if it takes all summer"? 1804.
- What six books did Lincoln own when he was 21? 1073.
- How did some fence rails he split help to win him the presidency? 1073.
- Did the Federal government intend to assail the Confederate states when they seceded? 1074.
- What Confederate was one of the greatest soldiers America has produced? 1046.
- Did Robert E. Lee know the Union must triumph? 1047.
- How did Grant save Lee from being tried for treason? 794.
- What is the Fifteenth Amendment? 1595.
- Who were those low-principled northerners known as carpet-baggers? 340.
- What was the dreaded Ku-Klux Klan? 1013.
- Why did the government issue greenbacks? 1792.
- Who introduced Mardi Gras in this country? 1169.

- When and where was the first railroad built in the United States? 1581.
- How many miles of railroad in the United States in 1908? 1582.
- How many miles of railroad in the world in 1908? 1582.
- What is the strength of the United States army and navy? 1984.
- What is the population of the United States of each: Indian, Negro and foreign born? 1976.
- What is the salary of each cabinet officer? 1984.
- When was the Naval Department of the United States formed and by what officers was it controlled? 1985.
- How did the naturalization laws of the United States compare with those of other countries? 1307.
- How is the Signal Service of the United States operated? 1755.
- In what way are taxes imposed in the United States? 1874.
- How many judges are there in the Supreme Court of the United States? 467.
- What is the duty of consuls? 448.
- What is the present policy of the United States government with regard to the Indians? 921.
- To whom is the United States indebted for the purchase of Alaska? 1730.
- What is the most populous city of southern California which was founded by the Spaniards? 1116.
- What came near involving the United States with Chile in 1891? 388.
- How is the number of representatives in Congress regulated, and how often is their number changed? 442.
- Who commanded the famous *Alabama*? 1722.
- When did the first Colonial Congress meet? 442.
- What celebrated Polish general took part in the American Revolutionary War? 1011.
- What was the beginning of the postoffice? 1536.
- Which was the last settled of the thirteen states? 752.
- Where are the mints of the United States? 1237.
- What famous battle was fought at Gaines' Mills? 728.
- What are the most noted cases of impeachment? 917.
- In what war was the *Monitor* first used? 1251.
- What persons are barred from serving as electors? 596.
- What tribe of Indians took sides with the British during the Revolutionary War? 376.
- Why was the first political party called Federalists? 1519.
- What naval battle is known as Perry's victory? 1454.
- Which presidents have been elected by the House of Representatives? 1545.
- Whom do the Americans address as His Excellency? 12.
- In what famous battle did the British lose twenty-six hundred and the Americans but six men killed and thirteen wounded? 952.
- What general in the Civil War was called Superb? 833.
- What harbor was headquarters for the northern division of the American fleet during the War of 1812? 1651.
- What is the Signal Service? 1755.
- What was the beginning of the second Seminole war? 1396.
- When was the town of Chicago organized? 379.
- When did the Democratic party come into existence? 1520.
- What year were there four candidates in the field, all claiming to be Democrats? 1520.
- Who led the Whig party and what ground did it take? 1520.
- What first weakened the Whig party? 1520.
- When did the Whig party cease to exist? 1520.
- When did the Anti-Masonic party arise? 1520.
- Of what was the Republican party formed, and when? 1520.
- When were each of the three following parties formed: Greenbackers, Constitutional Union and Union Labor party? 1520.

- Where did the first and the last battle of the Revolution take place?
1520.
- What were the principal features of President Polk's administration?
1518.
- Who commanded the "Green Mountain Boys," and in what battle? 52.
- When and by whom was the District of Columbia ceded to the United States? 535.
- What is the oldest permanently settled city of Iowa? 556.
- What was the first instance of negro slavery we have in the United States? 2024.
- When was the beginning of the modern navy of the United States?
1313.
- What caused the Seminole War in the United States? 1722.
- What was the Stamp Act and when was it repealed? 1808.
- When did St. Louis become a town? 1659.
- Who discovered the source of the Mississippi River? 1690.
- Who was appointed commander of Florida with orders to plant a Spanish colony, and with what results? 1203.
- What was the early postal service of the United States? 1536.
- What is the extent of the Postoffice Department? 1537.
- What are the duties of the office of Attorney-General? 1985.
- Who was founder of Maryland? 1182.
- Which was the first state to ratify the Constitution? 517.
- What slave state did not secede during the Civil War? 517.
- In what state of the Union are the people nicknamed the Blue Hen's Chickens, and why are they so called? 517.
- What state has a pillory and whipping-post? 517.
- What state's name signifies the Land of Flowers? 683.
- How and by whom was Florida discovered? 683.
- What is the great corn state of the Union? 935.
- What Indian war cost the United States thirty million dollars? 379.
- What tribe of Indians owned slaves and fought with the south? 394.
- Who were the first people to visit Michigan? 1219.
- When was Lincoln's name presented for the vice-presidency by the Illinois delegation at the national Republican convention? 1074.
- Who made the first settlement in Alabama? 36.
- What was the most important act of Jefferson's administration? 952.
- What was the most terrible and destructive battle of the Civil War?
762.
- When did Congress adopt the national bank system? 167.
- What states have passed laws prohibiting the sale of liquor? 1927.
- What was the first settlement after Jamestown? 38.
- When was the United States flag adopted? 679.
- What was the earliest English settlement in the United States? 959.
- Where are the United States mints located? 1238.
- What city in the United States is third in importance as to exports?
1330.
- Where is the United States Artillery School? 115.
- Where is the seat of our Naval Academy, and by whom founded? 74.
- What was the character of the first United States postage stamp?
1809.
- When and by whom was the first tariff act drawn up in the United States? 1871.
- What was the first tariff measure enacted in the United States to protect industries? 1871.
- What state passed an act in 1833 declaring the United States tariff-law null? 1785.
- What completed the ruin of the Federal party in the election of 1816?
845.
- What was the largest amount ever owed by the United States government? 1305.
- When did postal cards come into use? 1537.
- When did free mail delivery begin? 1537.

- What treaty was made on the spot where Philadelphia now stands? 1446.
 What bishop was appointed major-general by Jefferson Davis? 1518.
 What territory comprises the Louisiana purchase and what was the consideration? 1119.
 When was Louisiana admitted as a state, and what its area? 1119.
 What large concession did Mexico make with the United States in 1848? 1216.

ASIA.

- Where is thought to be the cradle of civilization? 119.
 What European countries have at different times founded colonies in Asia? 119.
 What European countries are now struggling for mastery in Asia? 119.
 Who was first to sail around Asia? 1750.
 What famous tomb in India is described by travelers as a glimpse of Paradise? 1866.
 What was the beginning of the Selucian Empire? 1720.
 When was Phœnicia in her greatest power and glory? 1473.
 What Assyrian placed the ancient world under one ruler for twenty years? 125.
 What city was the center of the world's traffic in the twelfth century? 278.
 What country was closed against other nations till 1876? 1011.
 Who was the first Assyrian king to invade Egypt? 625.
 What first weakened Tyre when at its best? 1963.
 What city was the home of Xerxes and Cyrus the Great? 1680.
 Who was the greatest king of Babylonia? 153.
 What is the most extensive and powerful kingdom in western Asia? 1455.
 Who was the real founder of the first Assyrian empire? 125.
 At whose death was Turkestan split into fragments? 1955.
 From what does Mesopotamia derive its name? 1210.
 In what way has an accurate account of the reign of Darius of Persia been obtained? 504.
 What evidence have we that the Assyrians reached a high degree of wealth and civilization? 125.

AUSTRALIA.

- When did Australia have its beginning as a British settlement? 142.
 For what purpose were these early settlements used? 143.
 When was Australia found on a geographical chart? 142.
 When did the reception of convicts cease? 144.
 What gave an impulse to the colony in the early fifties? 142.
 When did the government become representative? 142.
 When did education come under state control? 143.

INDIA.

- The invasion of India by what people brought the Sanskrit language and the Hindu religion? 919-20.
 Who was the greatest sovereign India ever had? 920.
 What European nations began settlements in India early in the eighteenth century? 920.
 When did the British East India Company settle in India? 920.
 When and by whom was the first charter granted to the East India Company? 576.
 Who was the youngest governor-general ever sent to India? 497.
 When did the British East India Company cease to exist? 920.
 What emperor of India liked to be called Conqueror of the World, and was made a prisoner for life in his own castle? 140.

LITERATURE

ORIENTAL.

- What can you tell about the vastness of Chinese literature? 1080.
 Are there any others that are as large? 1082.
 Who was the greatest and wisest of Chinese? 441.
 What has been his influence? 441.
 What are the Chinese classics? 1080.
 Whose books were used in the Chinese government examinations until a few years ago? 1080.
 What are the histories of China? 1080.
 Of what are the philosophical and art divisions of the Chinese library composed? 1080.
 Of what is the *belles-lettres* division composed? 1080.
 Is Chinese poetry an important division of their literature? 1080.
 What classes of Chinese literature, though really good, are not included in the national library? 1080.
 When was paper first used in printing? 1080.
 What is the character of Sanskrit literature? 1080.
 What kind of writings are the most important Hindu writings? 1080.
 Did the Hindus write any great epic poems? 1080.
 What class of Hindu writings is found all over the world? 1080.
 What is the rank of Hindu drama as compared to Greek and to English? 1080.
 What are the oldest literary documents known? 919.
 What literatures were lost for thousands of years and how were they recovered? 125, 152, 1081, 1635, 486, 873, 1082.
 How early do we find Babylonian writings? 1080.
 What is their nature and how were they written? 1080.
 Had the Babylonians any great poems? 1080.
 What kinds of books did they write? 1080.
 In the ruins of what famous city was Assyrian literature found? 1352.
 What was the principal object of the foundation of the Assyrian library? 1081.
 What can you tell about this library? 1081.
 When was most of it written? 1081.
 Which came first: Babylonian or Assyrian? 125, 152, 1081.
 Did Assyrian influence Hebrew literature? 1081, 125.
 For what are almost all civilized nations indebted to the Phœnicians? 1081.
 Who was the Marco Polo of the Phœnicians? 1081.
 Where was the key to Assyrian, Babylonian and Persian literature found? 271, 486, 504, 1040, 1352, 1589, 1635.
 What is the Zend-Avesta? 1081.
 Who is believed to have written it? 2136.
 What people use it? 1426.
 When did Persian literature flourish most? 1081.
 With whom did Persian poetry reach its height? 1081.
 Who was the greatest of Persian lyric poets? 1081.
 Who wrote the *Rubaiyat*? What does the name mean? 1382.
 What is the greatest production of Hebrew literature? 1081, 209.
 What sorts of books did its authors write? 209.
 Were any Jews historians? orators? philosophers? poets? 209.
 What writings by Jewish writers are not included in the Protestant canon of the Bible? 1081.
 What are the great translations of the Bible? 209, 759, 970, 1915, 2030, 2114.
 Who was the first of modern commentators on the Bible? What influence did he have on the growth of Judaism? 1081.
 What great modern philosopher was a Jew? 1799.
 Who are some of the modern Jews who have taken prominent rank in literature, science and art? 1082.
 What are Egyptian hieroglyphics? 873.
 How were they deciphered? 1635.

What is *The Book of the Dead*? 1082.
 Who was Egypt's first historian? 591, 1157.
 What varieties of literature had the Egyptians? 1082.
 How early was the science of medicine known in Egypt? 1082.
 Who was Egypt's Homer? What poem the Egyptian Iliad? 1082.
 Did the Egyptians write novels? 1082.
 What early literature is Christian? 1083.
 What was the most important result of Syriac writings? 1083.
 What is the oldest book in Syriac in existence? 1083.
 How were prize poems in Arabia sometimes written? 1084.
 What can you tell about the expansion of Arabian literature in the eighth and ninth centuries? 1084.
 What was the condition of Arabia during Europe's dark ages? 1084.
 Upon what were Arabian law and theology based? 1084.
 In philosophy whom did the Arabians regard highly? 1084.
 In mathematics for what are we indebted to the Arabians? 1084.
 From what Arabian literature did that of Europe gain much? 1084.
 How did the stories of *The Thousand and One Nights* come to be told? 1084.

GREEK.

What are the two great Homeric poems, and what can you tell of them? 1082, 882.
 Was Homer the only epic poet of Greece? 870, 1082.
 What is the difference between a lyric and an epic poem? 1510.
 Who was the greatest Greek lyric poet? 1082, 1491.
 What other lyric poets won undying fame? 96, 1678, 1759.
 What caused the growth of the drama? 1082, 550.
 Who were some of the most important Greek dramatists? 20, 97, 632, 1781.
 What tragedian does tradition tell us was killed by an eagle dropping a tortoise, to break its shell, on his bald head, mistaking it for a stone? 20.
 Who was the greatest Attic tragedian? 20.
 Who is the head of the Greek dramatists? 550.
 What Greek dramatist is called the world's greatest laughter? 97.
 Who and what was Menander? 550, 1082.
 Who were some of the most important Greek historians? 1082.
 Which was the father of history? 868.
 Which was the philosophical historian? 1908.
 Which was the gentleman of leisure? 2117.
 Who were the three great Greek philosophers? 1082.
 Which one has had great influence on all thinkers since? 1082.
 What are the distinctive principles of the teachings of Socrates? 1502.
 What feature of Greek law caused oratory to become so prominent? 1082.
 Who was the greatest of orators? 1082.
 Who was the greatest writer of Greek comedies? 97.
 What city, founded not long before Demosthenes died, rivaled Athens in literature and scholarship? 45.
 What great translation of the Scripture was made there? 972, 209, 1762.
 What island contains but three towns of any size, though Vergil told of its hundred cities? 477.
 What has made Troy famous to the literary world? 1945.
 What made the Greek poet Theocritus famous? 1899.
 From what is the language of the Greeks supposed to have been derived? 801.
 What caused the decline of Greek literature? 1082.
 What was the most famous ancient library? 46.
 Where was it? Who founded it? 591.
 What story is told about its destruction? 46.
 What was Plutarch's professed purpose? 1606.

What important theologian sought to combine the results of Greek philosophy with the gospel during the second century? 1393.
 What is meant by the term pseudonym? 1188.
 To whom is the world indebted for the first complete edition of Homer?

ROMAN.

When did Roman literature commence? 1083.
 Did Rome ever have any really native literature? 1083.
 Upon what was Roman drama founded? 1083.
 Who were the Roman dramatists? 1083.
 By whom and when was the satire founded? 1083.
 What is said to have caused the death of Terence? 1891.
 In what branches of literature did Rome excel? 1083.
 Who was the greatest of all epigrammatists? 1178.
 What can you tell of Cicero? 1083.
 What noblest Roman of them all was author, orator, scholar, soldier and statesman. 303.
 When was the Augustan age of Roman poetry? 1083.
 Who were some of the great writers of this age? 1083.
 What can you tell of their writings? 1083.
 Do any Roman epics compare with those of India and Greece? 1083.
 What man of the world is one of the world's lyric poets? 1083.
 Who was the chief comic dramatist of Rome? 1503.
 Who were the great Roman prose writers? 1083.
 Which were historians? Which essayists? Which letter-writers? 1083.
 Who was Nero's tutor, and what was his fate? 1723.
 What emperor was Plato's philosopher ruling the world? 139.
 Who was the earliest and greatest letter-writer in the world? 398.
 Who was the last of the great Latin poets? 984.
 From whom do we derive our impressions of the life of the upper classes of the first century? 1505.
 Who was the real first Roman historian? 1083.
 What great writer wrote satires against the rich? 1083.
 Who were other Roman writers of a later period? 1083.
 What Christian authors glorified the last days of Latin literature? 58, 137, 970.

ITALIAN.

What was the literary language of Europe during the middle ages? 1084.
 Who formed a trio of great Italian writers? 1084.
 In what country did literature reach its height in its opening? 1084.
 What did Dante's *Divine Comedy* do for literature and the Italian language? 501.
 Who was the Laura whom Petrarch immortalized? 1462.
 What works made Petrarch famous? 1084.
 What other great poets are glories of Italy? 96, 1873.
 Are there any Italian dramatists? 1084.
 What Italian historical product has been translated into most modern languages? 1084.
 Who was the foremost Italian of the seventeenth century? 730.
 What makes Manzoni's writings valuable literature? 1084.

FRENCH.

Who figure in the oldest literature of France? 1625, 368.
 The earliest writings of the French were of what kind? 1085.
 What was Provençal? Who were the troubadours? 1944, 1554.
 What stirred the literature of France during the sixteenth century? 1085.
 Who was known as the jester of France? 1577.
 What Frenchman was the first and greatest of essayists? 1254.
 What is the greatest collection of printed books in the world? 1422, 1064.
 Who wrote *Institute of Christian Religion*? 311.
 What French queen was a considerable author? 1170.

- For what is the age of Louis XIV noted? 1085.
 What Catholic churchmen were great pulpit-orators? 1187.
 Who were some of the leading writers of this period? 1085.
 What work of this period is precious to Christians? 1085, 1427.
 What French scientist and writer founded modern philosophy? 522.
 French life under Louis XIV is set forth in what writings? 1085.
 What has been the most brilliant period of the Provencal language? 1554.
 What were the characteristics of French literature of the eighteenth century? 1085.
 What work influenced French thought to a great extent during this period? 1085, 1256.
 Who was the queen of letter-writers? 1729.
 What can you tell about Voltaire and his influence? 2029.
 Who was considered the greatest literary critic of modern times? 1663.
 Who was Rousseau? 1638.
 What natural history, though not authentic, is considered a French classic? 1085, 286.
 What was the leading novel of the eighteenth century? 1085, 1057.
 Who was the prince of French orators? 1238.
 What romantic idyl was Napoleon's favorite book? 1662.
 In the nineteenth century what school arose in French literature? 1085.
 Who were the leaders of this school? 1085.
 What are some of the writings of the most popular authors of the romantic school? 1085.
 Who was considered the greatest French novelist? 1085, 895.
 What woman was the George Eliot of French fiction? 1673.
 In what department of French literature of the nineteenth century has the greatest work been done? 1085.
 Who is the chief French poet of the nineteenth century? 1085.
 What other French poet is almost as famous? 1292.
 Who are some of the leading nineteenth century historians? 1085.
 What French historian set historical study on foot in Europe in the nineteenth century? 813.
 Who are the leading philosophers and critics of this century? 1086.
 Of whom is it said: "He found French poetry a piece of brick and stucco and left it a palace builded of jewels?" 895.
 How did the author of *Monte Cristo* bring himself into disrepute? 560.
 Who joked the Provençals and created *Tartarin of Tarascon*? 506.
 Who was the earliest French historian? 704.
 What notable journalist, although French, wrote in English? 230.

SPANISH.

- What is the *Poem of the Cid*? 1086, 398.
 What is the best book of chivalry? 56.
 How did the Spanish obtain their ballads? 398, 1086.
 When were the best Spanish lyrics written? 1086.
 What Spanish scholar published the second polyglot Bible? 2118.
 What drama is a novel, what novel a drama? 1086.
 Who were the lyric poets of Spain? 1086.
 Of whom did Byron say: "He laughed Spain's chivalry away"? 361.
 What is the best known and best loved of all Spanish books? 1086.
 Who were some of the dramatists of the golden age of Cervantes? 1086.
 Who wrote nearly two thousand plays? 2007.
 When did Spanish literature decline? 1086.
 Are any of the best European novels between 1800 and 1900 the work of Spaniards? 1086.
 What Spanish orator was a modern Cicero? 347.
 What nation has the greatest number of proverbs? 1555.

PORTUGUESE.

What tale of chivalry set European romance agoing? 56.
 Who was Portugal's great poet? How did his writings affect the people? 315, 1086.
 With whom did the Portuguese literature reach its height? 1086.
 What can you tell of the nineteenth century literature of Portugal? 1086.

FINNIC.

What one of the great epics of the world originated in Finland? 1086.
 Who discovered it? How did he recover it? 1086.

DUTCH.

Who was the first writer to create a good Dutch prose? 1086.
 For what is Vondel noted? 1086.
 What was the only book, except the Bible, that for a long time was found in Dutch homes? 1086.
 Who were some of the important Dutch writers? 1086.
 What Dutchman wrote *Imitatio Christi*? 996.
 Which founded international law? 1038, 1086.
 Who was the Prince of the Renaissance? 623.
 What Jewish Dutchman was a great philosopher? 1799.

SCANDINAVIAN.

What is included in Scandanavian literature? 1087.
 What do you understand by *Edda*? 1087, 581.
 What were the sagas? 1087, 1628.
 In what modern literatures do they play a part? 1266, 785, 1606, 1756, 2033, 1347.
 What was remarkable about the Icelandic sagas? 1087.
 When did the literature of Norway first become of importance? 1087.
 What Norwegian was considered one of the great dramatists of his day? 909.
 What is the nature of Björnson's writings? 1087, 221.
 Who founded the Copenhagen theater, and what were some of his writings? 1087.
 What is Denmark's national song? 1087.
 Who wrote it? 1087.
 What Danish historian revolutionized our ideas as to the first five centuries of Roman history? 1349.
 Why do most of us know Hans Christian Andersen? 1087.
 Among great critics who is a Dane? 260.
 What was the nature of the earliest Swedish writings? 1087.
 What great naturalist greatly influenced the literature of Sweden? 1087.
 Who was the great theological writer of the eighteenth century? 1087.
 What Swedish lady was a famous novelist? 263.
 What is the most powerful Swedish novel? 1087.
 What epic at once became the most popular poem in Sweden? 1880.

GERMAN.

How far back does German literature date? 1087.
 Who were the *Minnesinger*? 1087, 1236.
 What two epic poems are considered to be the greatest treasures of German national literature? 1087.
 What can you tell of these epics? 1087, 1347.
 What great tone-poet used them and the sagas? 2033.
 During the fifteenth century what plays rose to their height? 1087, 1238.
 Do any of them survive still? 1368.
 What famous fable did a German write? 1604.
 What fixed the literary language? 1087.
 With whom does modern German literature commence? 1087.
 Who is called the Luther of German literature, drama and art? 1058.
 What German savant almost equaled Newton?

- How do German scholars rank with the scholars of the world? 1087.
 Who are some of the brilliant philosophers of Germany? 659, 857, 992, 1688.
 Who constituted the "ideal" school of philosophy? 659.
 What great German philosopher said: "Whoever will tell me of a good action done, him will I thank, though it be the last hour of my life"? 857.
 What Scotch philosopher "woke him from dogmatic slumbers"?
 Who was Schelling? 1088.
 Who are some of the great German historians? 1087.
 What German historian lived to be ninety, and wrote about fifty works on history? 1587.
 What German historian wrote a Roman history? 1249.
 Who was the great scientist of Germany? 897.
 Who was Goethe and what can you tell about him? 777.
 What English novel influenced Goethe greatly? 2018.
 Whose early writings greatly excited the German people? 1087.
 How did Goethe and Schiller rank as dramatists? 550.
 How do they rank in the world of letters? 1088.
 What influenced the study of Shakespeare in Germany? 1087, 1689.
 What satirist exerted a mighty influence over the German middle classes? 1613.
 About 1850 who ranked with Goethe and Schiller? 1087, 858.
 Who is the most eminent German novelist? 718.
 Who else were German novelists? 136, 718.
 What German was a tone-poet? 2032.

CELTIC.

- What remarkable people's literature is chiefly known in its French and English forms? 357.
 What famous poem from this literature created a sensation in the eighteenth century? 1397.
 What was the name of the poets of ancient Britain and Gaul? 554.
 What British hero gave rise to much of this literature? 114.
 What famous poet was associated with him? 1207.
 What noble institution are they said to have founded? 1638.
 Who were some of its noted characters? 198, 729, 949, 1035, 1109, 1943.
 What did they seek? 790.
 How did this literature work its way into French literature? 1628.
 What personages of mythology seem to be of Celtic origin? 646, 1129, 1142, 1294, 1559.
 Where was Camelot? 314. What was Excalibur? 640.
 Who really made the British legends a part of English literature? 1152.
 What English poets in modern times wrote about these myths? 1265, 1796, 1856, 1891.
 What German wrote musical dramas about Celtic heroes? 1109, 2033.
 Who has most nobly and successfully written about them? 1891.
 What great poems did he write? 913.

ENGLISH.

- When did English literature begin? 201, 618, 190, 302, 47.
 Was it written in English? 618.
 If not, in what language? 1088.
 Who was the first English poet? 201, 302.
 Who were the earliest historians? 47, 190.
 What were some of the literary results of the Normans conquering the English? 618.
 When did the first beginnings of our modern language arise? 618.
 What one man, more than any other, in effect formed English prose? 2114.
 What other man continued and strengthened this literary influence? 1915.

- What ancient literatures in the sixteenth century profoundly influenced English? 1081, 209, 1082, 1083.
- Who was "the welle of Englishe undefyled"? 373.
- What immortal book did he write? 1088.
- Did he owe anything to Petrarch and Boccaccio? 373, 1083.
- What scientific and philosophical Englishman lived in the thirteenth century? 154.
- What English authors flourished in the fifteenth century? 354, 1152.
- What form of poetry grew up in Scotland specially? 161, 1401, 1451.
- When did the Renaissance appear in England? 1088.
- What did the men of the time call it? 706, 1088.
- Who are a few of the famous literary men between 1509 and 1563? 1088, 1089.
- Who of them is the poet's poet? What famous allegory is his work? 1796, 1088.
- What great Englishman wrote about an ideal state? 1261.
- When was the Elizabethan age? 607.
- What made England then a nest of singing-birds? 1088.
- What prince of poets was born in 1564? 1733.
- Name a few of his works. 129, 831, 1004, 1130, 1206, 1222, 1399, 1630, 1886, 2097.
- What dramatist might have rivaled him? 1174.
- What friend of his was "rare Ben"? 978.
- Who was "the greatest, wisest, meanest of mankind"? 154.
- What interesting and important books did he write? 1089.
- To what quaint compiler of travels are we indebted? 825.
- What chivalrous courtier of the time wrote a history of the world? 1583.
- Had any English novel yet been written? What English romances existed? 1089, 1363, 1628.
- How does Milton rank with Shakspeare as a poet? 1089.
- What were his early poems? 1228.
- What was the character of the second period of his writings? 1229.
- What was Milton's masterpiece, and during what period of his life was it written? 1089.
- Who was the Saxon Milton? 302.
- During this period who wrote sermons that were famous in literature? 1876.
- Who was the inspired tinker and immortal dreamer? 290.
- Who were some other poets of Milton's time? 1089.
- Who was the greatest writer of the restoration? 555.
- What can you tell about *Absalom and Achitophel*? 1089.
- During what period did modern science arise? 1706.
- Who were the principal writers along this line? 1089.
- What were some of their writings? 1089.
- Who was the chief poet of the Queen Anne period, and what were his productions? 1527.
- How does the Queen Anne period of literature rank? 1090.
- What famous essayists wrote during this period? 12, 626, 1820.
- Who was the most forcible prose-writer of this age? 1856.
- What were some of his leading writings? 1090.
- Who wrote *The Seasons*? 1906.
- During this time who wrote a famous elegy and what was it? 797.
- Who wrote odes at this time? 425.
- Who wrote *Robinson Crusoe*? 515.
- What was the first modern novel and who wrote it? 1363.
- What was *Tom Jones*? 1090.
- For what are Hume and Robertson noted? 897, 1090.
- Who wrote *The Decline and Fall of the Roman Empire*? 764.
- What were the great names in English philosophy and kindred topics during the Queen Anne period? 1090.
- Who wrote *The Wealth of Nations*? 1769.
- Who were the two principal essayists of this period? 1090.
- Of whom was it said that he adorned everything he touched? 778.

- What man is known only as another's biographer? 249.
- What can you tell about *The Traveler* and *The Deserted Village*? 778.
- Whose poems combine intense passion and wonderful sweetness? 293.
- Whose poems are the most musical in the language? 1090.
- What was Goldsmith's most popular novel? 1090, 2018.
- What friend of Goldsmith made a famous dictionary? 976.
- What other friend was a great orator and a master of prose? 291.
- Whose poetry greatly influenced later poets? 2109.
- What are the most popular of Burns' writings? 293.
- What are the general features of the literature of the nineteenth century? 1090.
- Who wrote *The Ancient Mariner*? 421.
- Who wrote *The Excursion*? 2110.
- Who was the poet of Scotch chivalric legends? 1709.
- Where was his home? 2.
- What were his principal poems and novels? 1709.
- Immediately following Scott, what poet became the first of his time? 298.
- Who were the poets of brilliant imagination and intense passion? 994, 1738.
- Why were not Campbell and Southey appreciated? 1090.
- What man and his wife were great poets? 1090.
- What poet was called a "soul of fire in a shell of pearl"? 276.
- Who is generally considered the greatest English poet of the nineteenth century?
- When was *The Edinburgh Review* started? 1090.
- Who were some of its principal contributors? 274, 336, 522, 1023, 1130, 2092.
- Of whom was it said: There go Archimedes, Chesterfield, Demosthenes, Lycurgus, Newton and Solon in one? 274.
- Against whom was brought the accusation that omniscience was his *forte* and infallibility his *foible*? 1130.
- What department of English literature took the lead during the century? 1090.
- Who were the leading English novelists? 1090.
- What great novelist was charged with taking his characters from actual life? 529.
- Who wrote *Lucile*? What was his *pen-name*? 1128.
- Who are some leading English historians? 1090.
- What are some of the important biographies of recent years? 1091.
- What are the most notable books in politics? 1091.
- What are the merits of *The English Men of Letters Series*? 1091.
- What names stand among modern essayists? 1091.
- What writers have defended theism? 1092.
- Who were the leading scientific men of the period? 1091.
- What poets have appeared since Tennyson and Browning? 1092.
- What biographers of famous men have appeared since 1880? 1091.
- Who are some of the leaders in recent *belles-lettres*? 1091, 1092.
- Who were prominent in philosophy? 1092.
- Name recent historians and their works. 1091.
- What effect have Ruskin's views had on English art? 1644.
- What famous poem, found almost everywhere, brought the writer only twenty-five dollars for the copyright? 1229.
- What Scotch girl was made immortal by the pen of John Brown? 1172.
- Who was the greatest writer of sea-stories? 1176.
- What book made Thomas More famous? 1996.
- Who was the translator of *Ossian*? 1397.
- What celebrated author was in debt \$700,000 at the age of 55, all of which he paid with his pen? 1709.
- Who declined the position of poet-laureate in favor of Southey? 1709.
- What book did Dr. Johnson assert to be the first in the world for its knowledge of the human heart? 1611.
- Who was called the Father of English Poetry? 374.

- Who was styled the Moses of modern science, leading it to the Promised Land, but himself only viewing it from Mount Pisgah? 154.
 What was the first encyclopedia? 613.
 What was the first book printed in England? 354.
 Who was the first English sonneteer? 1851.
 What poem is said to contain more familiar quotations than any other of equal length in the English language? 1527.
 Who has been called the Father of the English Novel? 1363, 1611.
 What led Burns to write his first poem? 294.
 What famous poet swam the Hellespont? 298.
 What writer received from Elizabeth a grant of thirty millions of acres of American land? 1752.
 What writer of the nineteenth century gave up marriage to take care of an afflicted sister? 1023.
 Who was the first poet laureate? 1035.
 Who are the greatest English letter writers? 1058.
 What was the first English printed copy of the New Testament? 1915.
 What made Laurence Sterne forever famous? 1824.
 What was the wildest and wittiest satire of the eighteenth century? 1856.
 What was the first English version of the Bible? 210, 1088, 2114.
 What famous novel is the sad life of its author? 272-3.
 What made Mrs. Dinah Maria (Mulock) Craik famous? 473.
 What was the early life of George Eliot? 606.
 What famous author was called a Christian Socialist? 1005.
 What Scottish kings have become well-known through Shakspeare? 1708.
 What made Disraeli's novels popular? 534.
 What is *Domesday Book*? 542.
 What noted novelist was made baron at the death of his mother? 288.
 What clergyman described the loneliness of his parish by saying that he lived 17 miles from a lemon? 1770.
 What poet was made poet-laureate in 1813? 1788.
 What was Tennyson's first publication? 1891.
 When was Tennyson made a peer? 1891.
 Who is known as a wit and the creator of Mrs. Partington? 1770.
 Who started *The Edinburgh Review*? 1770.

AMERICAN.

- What was the character of the colonial period of American literature? 1092.
 When was the first printing-press set up in Virginia? 1092.
 What were some of the early Virginian books? 1092.
 What was the first book printed in America north of Mexico? 1092.
 In what book are found germs of much of the poetry and romance of Longfellow, Whittier and Hawthorne? 1092.
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 Who was the poetic prose-writer about nature? 1906.
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- What charm is the turquoise supposed to have? 1958.
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What is the national hymn of France? 1176.
Where was Mozart born? 1274.
Who wrote *America*? 1770.
Who was the great genius of the fifteenth century, and also painted the celebrated picture of The Last Supper? 1056.

- What great singer was admitted into the musical conservatories of Stockholm at the age of nine years? 1075.
- What singer of renown born in Naples gave instructions in singing to Queen Victoria? 1015.
- At what place is the famous miracle play produced every ten years? 1368.
- How did Adolph Sax greatly influence military music throughout the world? 1686.
- How did Ole Bull lose his large fortune? 287.
- What drama did Carlyle call the greatest dramatic work of the eighteenth century? 1689.
- What musical instrument is regarded as the ancestor of the piano? 559.
- Who was the greatest Italian composer? 1411.
- What was the earliest opera, and who was its founder? 1385.
- Where did melodrama originate? 1385.
- Who is the most famous modern Italian composer? 1385.
- When was oratorio first introduced? 1390.
- What great tragic actress was queen of the English stage during her time? 1752.
- Who holds the first place in London among living actresses? 1893.
- What is said to be the birthplace of the drama? 1898.
- With whom did quartettes originate? 1571.
- For what two great discoveries are pianists indebted to Bach? 153.
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- When were actresses first allowed on the French and English stage? 1898.
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- Who is John Philip Sousa? 1783.
- Who was the musical director at the Columbian Exposition? 1905.
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 What goddess is the muse of history? 1284.
 What is said of the muses? 1284.
 What hero of the Trojan War slew Antilochus in single combat? 1200-1.
 Who is called the early Roman god of war? 1176.
 What month was named in honor of Mars? 1176.
 How is Morpheus represented? 1264.
 What goddess is the muse of comedy? 1284.
 What god is forever excluded from paradise? 1452.
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 What goddess is the muse of choral dance and song? 1284.
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 Who is called the Greek sea god? 1320.
 Who are called the companions of Apollo? 1284.
 What does the word Saturnalia mean? 1683.
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 Who was called the god of heaven? 1899.
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 Who was the goddess of the muse of poetry or passion? 1284.
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 From what Greek god does our word tantalize come? 1870.
 What is said of Saturn in later life? 1682.

- What goddess was the muse of astronomy? 1284.
 Who were the vestal virgins and how long were they held in service? 2017.
 What god ruled the winds, seasons and agriculture? 1906.
 Who was Psyche? 1556.
 What are the Pleiades? 1504.
 When was the festival of Flora held? 683.
 What goddess was supposed to have power of restoring the aged to youth? 857.
 What goddess when she died was believed to have passed into the star Sirius? 945.
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 Who was Quirinus? 1631.
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 Who was the Roman god of the sea? 1320.
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- What goddesses were condemned to pour water into sieves in the vain endeavor to fill them, and why condemned? 500.
- Who dedicated his oxen and cart to Jupiter and tied the yoke with a hard knot? 781.
- What goddess changed men and women into animals with her drugs and charms? 400.
- What god avenged Osiris' death? 1396.
- Who was Orestes? 1392.
- How was Orion killed? 1394.
- Who was Hebe? 857.
- What are the mermaids? 1208.
- Who is the goddess of wisdom? 1232.
- Who is Pluto and what is his surname? 1507.
- What god was suckled by a she wolf and afterwards brought up by the shepherd Faustulus and his wife? 1631.
- Who was the greatest of Grecian deities? 2131.
- How can nature worship be traced? 913.
- What did the Greeks hold to be ministers of the vengeance of the gods? 842.
- What did Hero do against her nymph Echo? 579.
- What Roman goddess protects agriculture and the fruits of the earth? 360.
- What goddess was Odin's queen? 1372.
- How does Homer picture the Centaurs? 359.
- What did the goddess Circe do for Ulysses? 400.
- Who was the Greek hero of the flood? 524.
- What goddess succeeded Hebe as cupbearer to the gods? 736, 857.
- How was Isis discovered when she was grieving over the loss of Osiris, her husband? 945.
- What are called the twelve labors of Hercules? 867.
- What is a vampire? 2001.
- What goddess was turned into stone on Mt. Sipylus? 1352.
- What three sister goddesses had only one eye among them, and what were they called? 1198.
- Who were the Gorgons? 783.
- Who was Scylla? 1712.
- Who was called the god of thunder? 1906.
- Who was the goddess of fire? 2017.
- From what god does Thursday get its name? 1906.
- What are called Lamias? 2001.
- What was Themis the goddess of? 1899.
- Who were the father and the mother of Themis? 1899.
- Who was Charybdis? 1712.
- What god was called Old Man of the Sea? 1553.
- What presumptuous youth almost set the earth on fire? 1464.
- What famous god was worshiped in Athens by offerings of cows, goats, lambs, milk, honey and wine? 1415.
- From what god does Wednesday derive its name? 1372.
- What god with his two sons was killed by two serpents that rose from the sea and for what reason? 1029.
- What goddess detained Ulysses on her island for seven years and died with grief when he departed? 311-12.
- What god never grew weary, and why? 1906.
- What goddess was the muse of epic poetry? 1284.
- What does the story of Psyche represent to critics? 1556.

NATURE STUDY

- Who are called the Seven Stars? 1504.
What god became mad when he realized he had killed his mother? 1393.
Who were the Sirens? 1762.
How was Minerva represented? 1232.
What is said of Pelops? Whose child was he? 1443.
What goddess held sacred the olive branch, the serpent and owl? 1232.
Who was Orion? 1394.
Who was god of the under world, the realm of darkness and ghostly shades? 1507.
What is said of the Titans; who were they? 1916.
What Grecian deity was called the Father of gods and men, protector of kings and supporter of law and order etc? 2131
What was supposed to be the stream of oblivion in the lower world? 1058.
What divinities in Scandinavian mythology personified various elements of evil? 980.
What is an idol? 913.
What did savages use as their idols? 913.
How did Homer make mention of the Harpies? 842.

NATURE STUDY

- What is a fine starting point for school work? 1307.
To what do parents pay too little regard in the first five years of a child's life? 1307.
What does nature study include? 1308.
What is the best way to start off with nature study? 1309.
How has the camera helped nature study? 1309.

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- What is the value of house-pets? 889.
What are the most effective watchdogs? 889.
What are valuable outside watchdogs? 889.
What dog protects poultry from skunks and weasels? 889.
What is a dog's toothbrush? 889.
What makes a dog smell "doggy"? 889.
What will kill fleas on a dog? 889.
What is a cat's medicine? 889.
How many song birds does a cat kill in a year? 889.
What prevents cats from killing mice? 889.
What causes canaries to become diseased? 890.
What is the best seed for canaries? 890.
What causes loss of voice in canaries? 890.
What is the color of the wild canary? 321.
What will red pepper and sponge cake do to wild canaries? 321.
What are the most choice of all canaries? 322.
Why are rabbits and guinea pigs popular? 890.
How often do rabbits breed? 890.
How should rabbits be handled? 890.
How should guinea pigs be treated? 890.
What makes pigeons attractive? 890.
What are the best quarters for pigeons? 890.
Why must each family have a separate home? 890.
How may pigeons be tamed? 890.
How many squabs a year will a pair of pigeons raise? 890.
What was the first animal domesticated by man? 538.
How may dogs become civilized? 539.
What are the chief races of dogs? 539.
What is one of the best sheep dogs? 539.
What dogs are expert swimmers? 539.
How did Robert Bruce escape from bloodhounds? 539.
What is the Great Dane? 539.
What is the common badger-dog? 539.
What hounds have almost lost the power of scent? 539.

What is the most brutal of the dogs? 539.
 What is one of the oldest dogs in Great Britain? 539.
 In what country is a dog the poor man's horse? 539.
 What dog is an irredeemable thief of food? 539.
 What are the members of the cat family? 347.
 What is the American wild cat called? 348.
 What are the best known domestic cats? 348.
 What kind of a cat has no tail? 348.
 What was said of the black cat in the Middle Ages? 348.
 What is the difference between a rabbit and a hare? 1577.
 Where were 25,000,000 rabbits killed in a year? 1577.
 What is the origin of the name hare-lip? 837.
 What are the natural enemies of rabbits and hares? 837.
 What immense injury results from the absence of natural enemies? 837.
 What curious mistake is made about guinea pigs? 812.
 What is the turtle dove? 1489.
 How did Darwin use pigeons? 1490.
 Is the carrier pigeon the one that carries messages? 1490, 341.
 Are doves distinct from pigeons? 1490.

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How can bird houses be made cat proof? 1321.
 How are birds unlike all other animals? 217.
 Did birds ever have teeth? 217.
 How many kinds of birds are there in the world? 217.
 What is the best way to observe birds? 217.
 Name some of the water birds? 217.
 To what class do most of the song birds belong? 217.
 What kind of a bird is a common chicken? 217.
 What are the running birds? 217.
 How do the mining birds build their nests? 217.
 What bird lays its eggs on the bare ground? 217.
 What are the mound building birds? 217.
 What bird builds its nest like a baker's oven? 217.
 How does the carpenter bird build its nest? 217.
 What bird is locked up in its nest while hatching? 218.
 What are summer and winter birds of passage? 218.
 What man first saw birds of paradise in their native homes? 218
 Does the male or the female have the beautiful feathers? 218.
 How many kinds of birds of paradise are there? 218.
 What birds are never seen in flocks? 687.
 What birds catch insects on the wing? 687.
 What bird is unjustly accused of killing many honey bees? 1004.
 What bird sings *pewit-phoebe*? 1473.
 What bird has a dreamy note of *pee-a-wee*? 1463.
 Where does the horned lark live? 1031.
 What member of the blackbird family is called a lark? 1194.
 Where do 40,000 crows assemble at one time? 482.
 What birds does the jay imitate? 966.
 Where is the red-winged blackbird found? 222.
 What bird is called a locust bird and the ax-bird? 1813.
 Are the orioles of the U. S. the same as those of Europe? 1394.
 What bird is shot for the table as reed birds? 232.
 Where is this bird called the rice bird? 232.
 What is the "gladdest bird that sings"? 233.
 What bird rides on a cow's back? 469.
 What bird has three broods a year? 1791.
 What is the American representative of the European kestrel? 1792.
 What is the bluest bird that flies in North America? 923.
 What bird is called the thistle bird and yellow bird? 778.
 What bird feeds largely upon rice? 807.
 What is the typical bird of the air? 1852.
 What bird protects the negro's chicken yard? 1179.
 What bird is called a swallow, but is more closely related to the humming bird? 1855.
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- What is the most common bird of the South? 1244.
 What bird makes a sound like the squeak of a hurt chicken? 1245.
 What bird uses its tail in climbing? 476.
 What bird can walk on a limb head downward? 1365.
 What bird says: "Yank! Yank! Hank! Hank!?" 1366.
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 Is the robin in America the same as in England? 1620.
 Where does the robin-redbreast live? 1505.
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 Why is the shrike called the butcher bird? 1748.
 What birds are included among poultry? 1540.
 Why are fowls allowed in the vineyards of France? 1541.
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 What was the parent of our common domestic duck? 557.
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 What duck is called the greenhead? 1152.
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 What bird robs the osprey? 678.
 What bird can put a whole fish in its mouth? 1442.
 What bird do the Chinese train for fishing? 456.
 What bird can fly 150 miles an hour? 647.
 What is a noble hawk? 647.
 How did the sandpiper get its name? 1647.
 How many kinds of snipe visit the U. S.? 1773.
 Where is that famous war eagle *Old Abe*? 572.
 Which of the owls should be protected? 1403.
 What owl steals all kinds of poultry? 1404.
 What bird is called the raincrow? 485.
 What birds were supposed to breed in the halcyon days? 1004.
 How fast can an ostrich run? 1398.
 How many pounds of feathers are taken from an ostrich? 1398.
 How big is an ostrich egg? 1398.
 How much is a pair of ostriches worth? 1398.
 What is the best food for an ostrich? 1398.
 What large bird carries a helmet on its head? 347.
 What bird is also called the loon? 536.
 What birds have been killed in immense numbers to trim ladies' hats? 814.
 What birds are called sea swallows? 814.
 What is one of the handsomest of all birds? 1853.
 What birds do the Esquimaux use for clothing? 138.
 What bird never gets plump, no matter how much it eats? 868.
 What wonderfully beautiful bird has been a victim of woman's vanity? 869.
 What was the sacred ibis? 908.
 What is a bird of good omen? 1833.
 How long is the windpipe of the whooping crane? 473.
 What bird can swallow a kitten? 14.
 How do the toes of the coot differ from those of the rail? 1581.
 What is the proper name of the mudhen and crowduck? 451.
 What has happened to the golden plover? 1505.
 What is the best talking parrot? 1426.
 What parrots make the best pets? 1425.
 What is the cockatoo? 417.
 What parrot in New Zealand will kill a sheep? 1425.
 What two different birds are called partridges in the North and the South? 1426.
 What is the most common June bird in California? 1426.
 What bird is called pheasant in the South? 807.
 What bird puts on "snow shoes" in the winter? 807.
 What bird is the prairie chicken? 808.
 What bird is called the fool hen? 808.

What is the family name of the wild turkey? 1465.
 What bird seems to walk in the water? 1462.
 What birds do sailors call Mother Cary's chickens? 1462.
 What bird can outswim fish? 1444.
 What large bird eats snakes? 1716.
 How do the weaver birds protect their nests from snakes? 2061.
 What is the largest of all song birds? 1128.
 How was the lodo exterminated? 538.
 What bird can fly 1,000 miles in 24 hours? 388.
 What bird calls "teacher, teacher, teacher"? 1402.
 What immense loss did Audubon suffer by rats? 136.
 What splendid work is being done by the Audubon societies? 136.
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How many legs has an insect? 928.
 Is a spider an insect? 928.
 How do insects breathe? 928.
 How is an insect bottle made? 928.
 How should insects be mounted? 928.
 How are fields of grain protected from them? 109.
 What insects look like flaxseeds? 870.
 What is the 17-year locust? 397.
 Where does the 13-year locust live? 397.
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 What are the locusts of the Bible? 796.
 How do crickets make that chirping sound? 477.
 Can you tell a katydid from a grasshopper? 993.
 When do cockroaches come out to feast? 418.
 What animal is both a worm and an insect? 1453.
 What is a bee doing when it runs around over a flower? 191.
 What kind of bees make the most honey? 192.
 Do bees help the fruit raiser? 192.
 What does the queen bumblebee do in winter? 192.
 What insect makes its nest of paper? 2050.
 What insects are fed by a nurse? 76.
 What insect has a home sometimes 12 ft. high? 77.
 What insect digs a pit for others to fall into and then eats them? 81.
 What insect shoots a strong liquid at its enemies? 194.
 What is a good protection against fleas? 682.
 Are the fly and the apple worm relatives? 687.
 Does the common house fly bite? 687.
 Is it the male or female mosquito that stings? 1269.
 Why is the tomato worm called the jughandle? 350.
 Are caterpillars worms? 349.
 Do the moths fly by day or by night? 296.
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 Where does the electric light bug live? 600.
 Can the darning-needle or dragon-fly hurt a person? 548.

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How are codfish caught? 419.
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 What fish is called the pumpkin seed? 1849.
 What is one of the finest game fish in the world? 179.
 What fishes prepare nests to hatch their eggs in? 1827, 179.
 Does the wall-eyed pike belong to the pike family? 1451.
 Is there any difference between pickerel and pike? 1490.
 What is the muskallunge? 1490.
 How is the trout related to the salmon? 1945.
 What fish can leap 6 or 8 feet out of the water? 1666.
 How are mackerel caught? 1138.
 From what fish do we get isinglass? 1842.

What fish is called Albany beef? 1841.
 Is the sea dogfish the same as the fresh water dogfish? 540.
 What different names has the mudfish? 1274.
 From what fishes does shagreen come? 1732.
 What fish skin was formerly used as sandpaper? 1735.
 How long is the man-eating shark? 1734.
 What are mermaid-purses? 678.
 Describe the stickleback's nest? 1827.
 What is the largest family of fishes? 339.
 Where are the blind fishes found? 228.
 What is the color of the original goldfish? 778.
 When did fish hatching begin in the U. S.? 677.
 What was the first fish to be protected? 1731, 677.
 How is the whitefish related to the fresh water herring? 869.
 Where do herrings come down in showers? 1748.
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Did the Romans eat oysters? 1406.
 What is commonly served in shrimp salad? 1748.
 How does the lobster swim backward? 1105.
 Why is the shell of a dead clam always open? 403.
 What is a decapod, or ten-footed animal? 471.
 What animal introduces us to zoölogy? 474.
 What mammal lays eggs? 557.
 What kind of a crab eats birds and rabbits? 472.
 What is a mammal? 1154.
 Is the starfish an animal or a fish? 1812.
 What wonderful power do starfish possess? 1812.
 What is Aristotle's lantern? 578.
 How does the ink of the cuttlefish protect it? 491.
 What other native of the sea makes an inky fluid? 1713.
 How does the squid swim backward? 1806, 491.
 Will the devilfish attack man? 1371.
 What is trepang? 1713.
 What sea creature lived in captivity from 1828 to 1887? 1713.
 What is the sand dollar? 1673.
 What animal is only one-half inch long when born? 1387.
 Is the "coon" related to the bear? 1577.
 Can a kangaroo climb a tree? 988.
 What animal is covered with a coat of armor? 104.
 How does the anteater catch insects? 77.
 What food is recommended for white mice? 1273.
 Is a dormouse the same as a white mouse? 545.
 What rat is like a little kangaroo? 1588.
 Where did rats come from? 1588.
 What is the shape of a muskrat's tail? 1291.
 How long can a beaver remain under water? 188.
 How do the beavers cut down a tree? 183.
 Describe the beaver's houses? 188.
 What trick does the badger play to protect himself? 156.
 How does the hedgehog differ from the porcupine? 857.
 Can porcupines shoot their quills? 1529.
 What little field animal has no neck? 1247.
 Why is the bat a "night policeman"? 180.
 Are bats blind? 180.
 Are bats gentle and friendly? 180.
 What is probably the largest animal that ever lived? 2073.
 Does the whale really spout water? 2073.
 Is the dolphin a fish? 541.
 What is done with the skin of the porpoise? 1529.
 How big is the sea cow? 1155.
 How much do elephants' tusks sell for? 604.
 What extinct animal furnishes ivory? 1155.
 How many toes has a horse? 886.
 What horses came from Arabian stock? 836.

What was the trotting record in 1818? 886.
 How do the stripes of the zebra and quagga differ? 1570.
 What is asses' milk valuable for? 122.
 What is a boar, a sow, a pig, a shoat? 1856.
 What is a valuable English hog? 1857.
 What are the bristles of the wild boar used for? 232.
 How does the Bactrian camel differ from the dromedary? 314.
 What are the humps of the camel used for? 314.
 How many days can they go without drinking? 314.
 Are there any wild camels in the U. S.? 314.
 Where does alpaca come from? 54.
 What animal will lie down and refuse to move when overloaded? 1105.
 How do the horns of the deer differ from those of the antelope and oxen? 513.
 What is the fleetest four-footed animal? 78.
 What is a stag? 514.
 How high were the antlers of the Irish elk? 514.
 What is the eland? 78.
 What is *shammy* skin? 365.
 What is the name of the American elk? 514.
 How long does it take an elk or deer to grow a pair of antlers? 608, 513.
 What animal fills the place of the horse, cow, goat and sheep? 1600.
 What is the caribou? 514.
 What animal can see on all sides at one time? 768.
 What ox-like animal refuses to eat corn? 2119.
 What savages make shields of buffalo hide? 285.
 What is the American buffalo? 285.
 How many buffaloes in the U. S. and Canada now? 220.
 How did the buffalo get relief from insects? 220.
 What is the name of the "horned horse"? 775.
 Where do mohair and cashmere come from? 776.
 What is the ibex? 908.
 What animal is like both an ox and a sheep? 1291.
 What bear marks a "keep off" sign on a tree in his hunting ground? 186.
 What bear grows as large as an ox? 186.
 What animal has a great sense of humor? 185.
 What animal enjoys coasting in winter? 1400.
 What is the value of a sea otter's skin? 1401.
 Does the weasel visit hen yards? 2060.
 Is the polecat the same as the skunk? 1764, 1516.
 What was the skin of the ermine formerly used for? 625.
 What little animal is a famous nest robber? 1235.
 Where does Alaska sable come from? 1765.
 What is the value of the silver fox skin? 703.
 What is the laughing hyena? 905.
 What is the American wild cat's right name? 348.
 What terrifying animal is really a coward? 1127.
 What is the lion's only enemy? 1078.
 Can a tiger defeat a lion in combat? 1911.
 What animal is called catamount, American panther and American lion? 1560.
 Are panthers different from leopards? 1056, 1417.
 What is the tiger of the New World? 955.
 Are there any wolves in South America? 2103.
 What is the jackal? 952.
 How is the walrus known? 2038.
 Does sealskin fur come from the seal or the sea lion? 1714.
 How do the hind legs of a seal differ from those of a sea lion? 1714.
 What animal's name means a ghost? 1053.
 What are the howling monkeys? 1252.
 What is the name of the smallest monkeys? 1252.
 What is the chimpanzee? 388.
 What ape can travel six miles an hour among the tree branches? 1389.
 Are there many gorillas in captivity? 783.
 What is the largest and fiercest of the baboons? 152.

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- Where do trees grow to be 500 ft. high? 1940.
 From what tree is the word "book" derived? 192.
 What tree is believed never to be struck by lightning? 193.
 What is one of our most valued timber-trees? 1367.
 What is the character of red oakwood? 1367.
 Which of the oaks is a valued ornamental tree? 1367.
 Which is the strongest of oak trees? 1367.
 What oak wood is used in cooperage? 1367.
 What oak has evergreen leaves, and is used in shipbuilding? 1367.
 How many pounds of sugar will a maple tree yield? 1166.
 What is bird's-eye maple? 1166.
 What is one of the first trees to bloom in the spring? 1167.
 How is boxelder related to maples? 1166.
 What is black ash used for? 118.
 To what family does the elder tree belong? 594.
 Why is the white elm famous in history? 609.
 Is the pecan a hickory nut? 872.
 Does white poplar come from the poplar tree? 1528.
 What is the aspen tree? 1528.
 What is the sweet bay tree? 1147.
 What tree produces turpentine, rosin and tar? 1492.
 What tree prevents the banks of streams from being worn away? 2090.
 What chestnut tree produces only one nut? 379.
 What wood is used in making artificial limbs? 282.
 What is the horse chestnut? 887.
 What wood was used for Egyptian mummy cases? 1858.
 When are butternuts used for pickles? 297.
 What is the plane tree mentioned in the Bible? 1858.
 What tree does red cedar come from? 354.
 What tree is the white cedar? 492.
 What is the cedar of Lebanon? 354.
 What is the enemy of the locust tree? 1107.
 What are the gum trees? 631.
 What leaves does the German maid use on her wedding day? 1294.
 What wood is used for tool handles? 541.
 What is the national flower of Flanders? 149.
 How does hemlock compare with pine wood? 860.
 What is spruce-beer made from? 675.
 What is Mexican honey water? 26.
 What plant is called by mistake century plant? 25.
 On what tree does the cocoanut grow? 1412.
 What tree produces sago? 1412.
 Where does vegetable ivory come from? 950, 1412.
 What is a common food article of the Arabs? 505.
 Where are Smyrna figs grown? 660.
 Describe the pomegranate fruit. 1523.
 Where are olives grown? 1379.
 How many bunches does a banana plant produce? 165.
 How is lemon extract obtained? 1052.
 Where is citron grown? 402.
 Why is the apple called the king of fruits? 85.
 To what family of plants does the apple belong? 85.
 What is the greatest apple country in the world? 85.
 Where does the apple thrive best? 85.
 For what is the common apple tree rightly valued? 85.
 Of what country is the peach a native? 1434.
 What fruits are related to the peach? 1434.
 What is the nectarine? 1434.
 How are peaches trained in England? 1434.
 In what months should peach trees be gone over? 1434.
 What two fruits are related to the pear? 1435.
 What place does the pear hold among orchard fruits? 1435.
 What is a pome? 1523.
 What plum is splashed with spots of red? 1506.

What kind of cherries are cultivated for canning? 377.
 What is cherry blossom time in Japan? 377.
 What is the choke cherry? 377.
 What cherry tree is valuable for timber? 377.
 What are prunes? 1555.

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How many species of grapes are there? 794.
 How many kinds of wild grapes are found in the U. S.? 794.
 What are the two principal products of grapes? 794.
 To what family does the grape fruit belong? 795.
 What is the pomelo and shaddock? 795.
 How does the blackberry differ from the raspberry? 222.
 What is the parent of the black raspberries? 1587.
 What black raspberries have purple flowers one and two inches in diameter? 1588.
 How are dewberries related to raspberries? 1588.
 What must house plants contend with? 890.
 Why is the kitchen a good place for plants? 890.
 When should plants be potted? 890.
 What is the best soil for most house plants? 890.
 What plants grow best in north windows? 890.
 What are the easiest plants to manage? 891.
 What is the most popular foliage plant? 891.
 What is the best time to plant hyacinths? 891.
 What is the most popular of flowers? 1633.
 What does horticulture include? 887.
 What is the general rule for pruning? 1555.
 What are dry fruits and fleshy fruits? 721.
 What city ships 5,000 carloads of raisins every year? 309.

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What is called the mother of sciences? 1471-2.
 What is the aim which philosophy always has in view? 1472.
 With whom is the history of philosophy said to commence? 1472.
 Into what three periods is the history of philosophy divided? 1472.
 What names mark the three periods of ancient philosophy? 1472.
 What is mediæval philosophy? 1472.
 Who are the founders of modern philosophy? 1472.
 Who was the greatest of all Greek philosophers? 97.
 What philosopher taught that pleasure is the chief good? 621.
 What philosopher, condemned to death, spent his last day discoursing on immortality? 1777.
 What philosopher left no written accounts of his teachings? 1777.
 What are the distinctive principles of the teaching of Socrates? 1502.
 What is Plato's theory of knowledge? 1503.
 What is education, according to Plato? 1503.
 What was Plato's highest idea in his view of philosophy? 1503.
 What are the four cardinal virtues? 1503.
 Who was the founder of the Italic school of philosophy? 1567.
 Who first assumed the title "philosopher"? 1567.

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What does the science of physics deal with? 1481.
 What properties of matter are excluded in a narrow sense? 1482.
 When do we know a truth scientifically? 1706.
 What are the only two things in nature that have an objective existence? 692.
 What is the *moment of force* of a body? 692.
 How is the word *force* much abused in popular usage? 693.
 What is the study of *applied sciences*? 1482.
 What are the different branches of engineering? 614.
 What qualities are necessary for success in engineering? 615.

DYNAMICS.

- What is the aim of the science of dynamics? 566.
 What is required in order to locate a particle? 566.
 What do we use to describe the change of position of bodies? 566.
 How is the velocity of a particle defined? 566.
 How is the unit of time measured? 1913.
 What is acceleration? 566.
 What is the science of motion called? 566.
 What is meant by *mass*? 566.
 What is the distinction between *mass* and *weight*? 1184.
 What is meant by *inertia*? 566.
 How is inertia measured? 925.
 What are the three fundamental concepts of dynamics? 566.
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 What is the linear momentum of a body? 566.
 What is force? 566.
 What is the distinction between kinetics and statics? 1814.
 What is meant by graphical statics? 1814.
 What are Newton's laws of motion? 566.
 What is the conservation of matter as stated by Lavoisier? 567.
 What are *work* and *energy*? 567.
 What is the unit of power? 1541.
 What is the principle of the conservation of energy? 567.
 What simple method is used to treat rotation and translation? 567.
 What are the two groups of energy? 567.
 What is the definition of potential? 1537.
 Does the potential energy of any system tend to increase or to decrease? 567.
 What is elasticity? 593.
 What is meant by *stress* and *strain*? 594.
 Why is perpetual motion impossible? 1454.
 How is density defined? 521.
 What is specific gravity? 521.
 What is the hydrometer? 903.
 What is the science of hydraulics? 903.
 Under what pressure do hydraulic engines work? 903.
 How is the possible work of a water-wheel determined? 2053.
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ANALYTICAL INDEX.

The purpose of the editors in the preparation of *The New Student's Reference Work* has been twofold—to give an accurate, up-to-date, and interesting treatment of all subjects of value to teachers, students, and general readers and to make readily available all such information. To complete the work so well begun in the choice and treatment of subjects and in the general arrangement of facts in the various articles, a complete analytical index has been prepared and will be found of the greatest assistance. The advantage of this Index may be briefly stated as follows:

(1) The selection of the subjects, which should be treated in separate articles, is the first task in the making of a reference work. Where a subject is not treated separately, however, information concerning it may be included in an article on another subject. At once it will be seen that without some means of locating such information much that is of value would be lost to the reader. Here the analytical index comes to his aid. An illustration of this point is found in the subject "Mosques" on Page 2477 of the Index. Here is a word of which the full meaning can be determined from any good dictionary. It is not, therefore, necessary to use space for that. There are, however, some important Mosques, the location of which is of value to the reader. These are all mentioned in other articles. By simply grouping in the Index the pages on which reference to "Mosques" is made all the information desired is obtained, needless repetition avoided, and space economized.

(2) There is a saving of time and needless annoyance by the use of the Index in being able to find the subject desired, irrespective of the title under which it is treated. For example, one may desire the biography of an author, but is only familiar with the pen name. Take for illustration "Marion Harland." In the text on Page 1892 the biography is given under the real name, "Mary Virginia Terhune." The Index, however, gives both names and proper page reference as follows:

Page 2455 of the index, *Harland, Marion*, (Mary Virginia Terhune): 1892.

Page 2505 of the index, Terhune, Mary Virginia (*Marion Harland*): 1892.

Thus one knowing the author under either the pseudonym or real name could find the biography as readily as though both names were known.

(3) An important feature is suggested by the references to "Agriculture," on Page 2414 of the Index. By use of this analytical arrangement one may quickly and with wonderful accuracy formulate a "brief" or an outline of any far-reaching subject such as this, and be fully prepared to take it before the school, to prepare a paper or talk, or to follow a course of reading as the occasion may require. To use "Agriculture" as an example: One would wish to consider first the "History of agriculture," and in that connection "Hebrew agriculture," "Medieval agriculture," "Modern agriculture," the development of the science in all the various countries named, "experiment stations," "colleges and schools," etc. Next would come soils, and in this connection "alluvium," "capilarity of soils," "chemistry," "distribution of crops," "rotation of crops," "nitro-gathering crops," etc. Next, one would probably want to classify the different branches of farming, as fruit raising referred to in "apples," "grafting," "spraying mixtures," etc.; and stock raising, "poultry," "stock breeding," "stock raising," "stock feeding," "veterinary science," and dairying, "butter," "creamery," "cream separator," "Babcock test," etc. The application of this principle to other subjects may be noted, as in the subject "Art," on Page 2418 of the Index.

(4) Noting carefully the foregoing, another advantage is brought into prominence, the ability on the part of the editors, through use of the Index, to condense their work, to eliminate repetition of facts and so classify subjects on which a great diversity of information is given, as to provide space for a number of highly important special articles and make the volumes a compact, convenient and usable library of reference. It may be stated that, in the opinion of the publishers, no such successful work in this line has ever before been undertaken.

It is the urgent advice of the publishers that reference be always made *first* to the Index. Even in finding subjects treated under familiar headings this is good counsel, for with the page in mind one may find the article in a fraction of the time needed to locate it by use of the alphabetical arrangement. When it is remembered that in some cases the subjects will be found not specifically treated in a separate article, in some treated under a title unfamiliar to the reader, and in many cases much added information of value on the subject will be found indicated in additional references, one can appreciate not only the Index as a feature of *The New Student's Reference Work*, but the wisdom of the advice here given.

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The pictures relating to any one subject, in addition to being indexed alphabetically, are also grouped under the subject headings. For example, all the full page illustrations pertaining to Physiology, in addition to being indexed under "Heart," "Brain," etc., are all brought together under "Physiology."

Geographical topics are not only classified under "Geography" and under the different continents and countries, but the headings "Agriculture," "Botany," "Geology," "Meteorology," and "Zoology," should be consulted.

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ONCE UPON A TIME.

THE HOW AND WHY LIBRARY

LITTLE QUESTIONS THAT LEAD
TO GREAT DISCOVERIES

BY

MRS. ELEANOR ATKINSON

Author of Greyfriar's Bobby, The Boyhood of Lincoln, Etc.

SCHOOL STUDIES MADE AS FASCINATING
AS FICTION FOR CHILDREN AND
READERS OF ALL AGES

*Includes an Explanation of the Beginning and Brotherhood of Life as Every
Mother Wishes her Child to Know It; A Trip Around the World; Picture
Visits to the Great Industries and Intimate Insights into the Ways
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The objects of the Congress shall be to bring into closer relations the home and the school; . . . to surround the children of the world with that wise, loving care in the impressionable years of life that will develop good citizens.—*From the Constitution of the National Congress of Mothers.*

To bring parent and school into closer relations is so important that we cannot overestimate it.—*Charles McMurry, Professor of Education, Northern Illinois Normal University and Contributing Editor to The New Student's Reference Work.*

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THE "WHY" OF THE HOW AND WHY LIBRARY



IT IS well known how eager all normal children are to go to school.

By "school" we mean not so much the Common School, as the Commoner School we call "Life."

A child instinctively asks questions. Curiosity is the appetite of the mind. His questions show that his mind is all ready for the answers. If they are given wholesome encouragement and direction, he will grow to find the greatest pleasure as well as profit in learning about the great and good things of the world he has inherited rather than the silly and the bad.

The answers can be made and are here made to lead straight into invention, art, science, engineering, good morals and good citizenship, preparation for a successful life—the development of a clean, strong body and a clean, strong mind.

To bring home and school into such practical co-operation in the development of the child—that is the greatest idea in the modern educational system; that is the purpose of the "How and Why Library." Its articles have a field all their own. They do not take the place of the delightful story books for children—of which there are many that are good in spite of the fact that there are so many that are either worthless or bad. Neither do they take the place of the text book. They prepare for the text book before the child starts to school; they supplement it after he begins.

Did you ever stop to think what a big thing a little key is? The "Hows" and "Whys" between these book covers are the keys to this wonderful world of ours. Without such keys the child cannot enter—cannot understand. This is the tragedy of the old school methods.

Modern education is entering a field of glorious possibilities for our children, but we must do our share. The school can help the home, but the home must help itself. The mother-teacher, the father-teacher, the big-sister and big-brother teachers must come back again.

After all, they're our children—our little brothers and sisters—aren't they?

Open the door and walk in—children and all. Because it is such a remarkable work for children, it is none the less a work of infinite charm for readers of all ages.

THE PUBLISHERS.

FOREWORD

REFERENCES: In the articles throughout this volume will be found frequent references to related titles for further reading or study. For example, the article on the "Good Luck Family" has this notation: "See Legume, Clover, Shamrock." The articles thus referred to will either be found in the present volume, as indicated in the Table of Contents, or in "The New Student's Reference Work," a descriptive announcement of which appears in the back of this book. These references have been made owing to the wide distribution of the "Student's," the ease with which reliable information can be secured in its pages and the fact that it has a place in the libraries of most of those who own "The How and Why Library."

ACKNOWLEDGMENTS: Grateful acknowledgments are made for the right to use valuable illustrations and for suggestions in the preparation of "The How and Why Library" to publishers, educators, public officials and others. Among these we wish to specially mention The Scientific American of New York, the Technical World Magazine of Chicago, the Woman's Magazine of New York, the Cleveland Leader, the Cleveland Plain Dealer, Charles K. Reed, publisher of the Bird Guide; J. J. West, Chief Scout Executive, and E. H. Merritt, Secretary of the Editorial Board, Boy Scouts of America; L. O. Howard, Chief of the United States Department of Entomology, Washington, D. C.; A. F. Sherman, Acting Commissioner of Immigration at Ellis Island; the Chicago Art Institute; Professor John M. Coulter, head of the Department of Botany, University of Chicago; and C. H. Speers, General Passenger Agent of the Colorado Midland Railway.

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"Nature Study", in the modern school, emphasizes, first of all, the things which the child can investigate most readily—birds, insects, flowers and trees. The following articles take him through the entire year and deal with the most important features of familiar plants, trees and insects and all the common varieties of birds. The child's interest in nature is spontaneous, and through no other medium can his observation and reasoning powers be so easily developed.

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PICTURE VISITS TO THE GREAT INDUSTRIES

Every child has an instinctive interest in the great industries and how the wheels "go round." Familiarity with these processes is one of the most practical phases of Geography teaching in our schools, and the co-operation of the home, if supplied with appropriate material, is easy and desirable. Nine typical industries of special interest to children are graphically presented in this department.

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GOOD HEALTH AND OUR SOLDIERS OF PEACE

The articles in the two departments following are intended to interest and instruct the child with regard to his own good health, and the family health (domestic sanitation), and to create a spirit of appreciative helpfulness toward those departments of city life which protect us from disease, fire and crime.

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THE HOW AND WHY OF COMMON THINGS

The questions asked every day by children are now recognized as offering a unique opportunity for parent and teacher. *They are the child's own spontaneous expression of his desire to know.* He is hungry. Feed him. In this department are answered in a very entertaining style nearly 100 typical questions. The properties of Heat, Light, Sound, Electricity and other natural forces are explained, and the foundation laid for the study of Physiology, Acoustics, Astronomy, Chemistry, Physics and other sciences in the higher grades.

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HOW AND WHY OF ETIQUETTE

Dr. Eliot says the subject matter of this section is one of the most important parts of education. "Manners" and knowledge of certain social forms are no less valuable in "getting on" in one's life work. Lack of such information and training frequently explains why some succeed while others of equal or greater natural ability, fail. Self control, grace of bearing, ease of expression, the habit of drawing out the best in others—these things the world rightly regards as the real tests of education. Yet proper and sensible guidance is difficult to find.

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STORIES IN GEOGRAPHY

CHILDREN OF OUR OWN AND OTHER LANDS

EDITORS' NOTE TO MOTHER AND TEACHER.—The study of descriptive and political Geography is introduced into the very first year of school, through travel stories. The first interest that little children show in other people and lands, is in the way other children live, particularly those of primitive peoples like the Indians and Esquimos, and people whose ways of living are radically different from their own. Geography teaching now takes advantage of this curiosity, on the part of the children, to introduce them to the general study. In this way they get a knowledge of the physical appearance, manners and customs, climate, products and transportation of other peoples and countries, in addition to some history and physiography. The supplementary reading with the geographical aspect, supplied to the lower grades, is very wide and comprehensive. To cover all that is supplied, requires the purchase of a great number of little supplementary readers, each at a cost of from thirty to fifty cents.

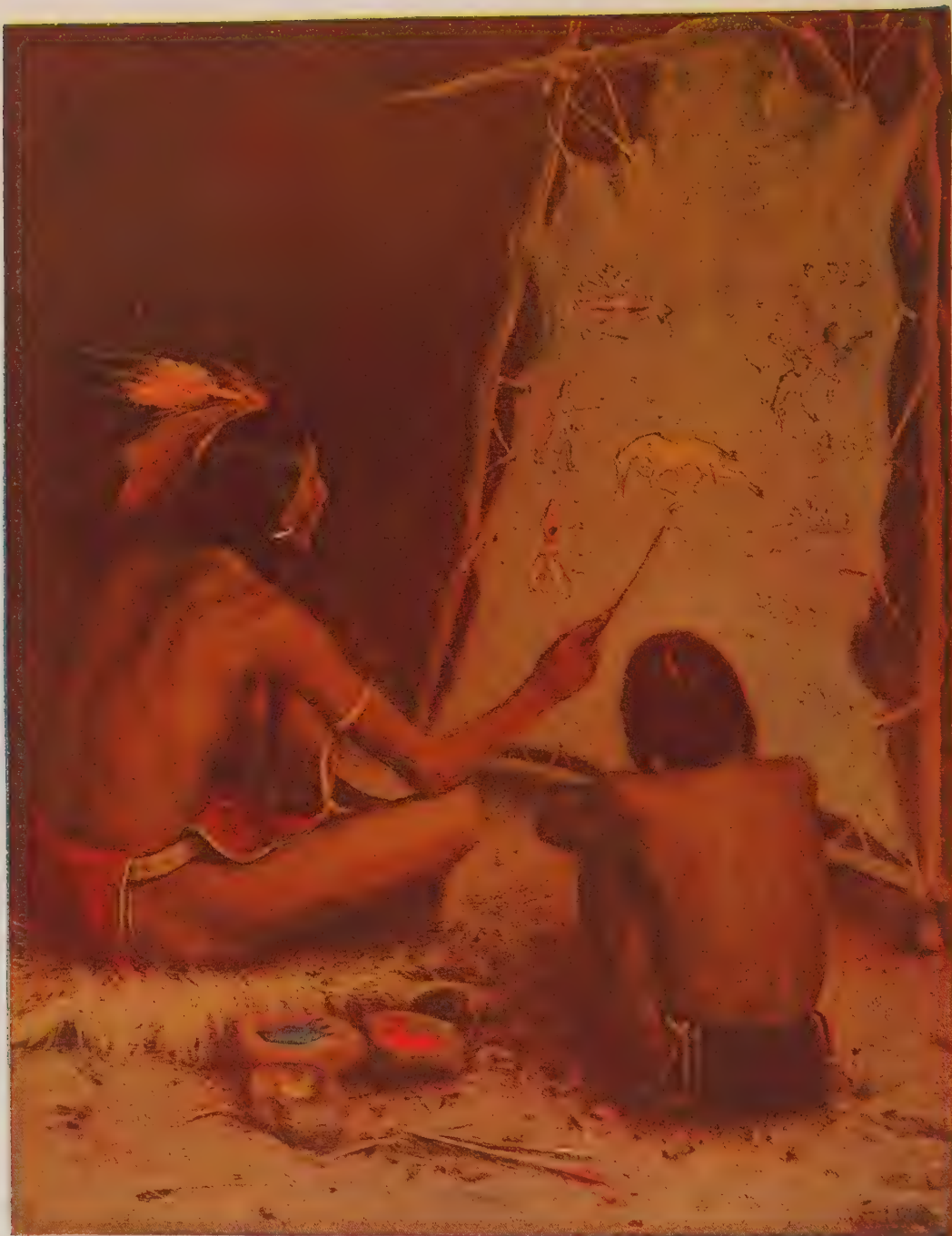
This geographical department covers the most essential and attractive features of any one dozen supplementary readers, and has, besides, a unity of plan that none of the readers possess. The plan is to present primitive America, when it was inhabited only by the red child, then to bring the other children in, over the sea, in the chronological order of the colonization and settlement of the United States. The order followed here is the Indian, the English Puritan, the French, the Dutch and the Negro. The Esquimo peoples were visited very early by the New England whalers, and the Spanish colonists by trading vessels that went to Havana.

When once the sea-board was peopled, came the period of the hunter in Kentucky. There the experience of Daniel Boone is taken as typical. This paved the way for the pioneer of the Lincoln period. During this time there were large migrations of German and Irish peoples. The discovery of gold carries the settlement of the United States to the Pacific coast. The subsequent development of California, as it is today, follows.

Once having reached the Pacific coast, curiosity is led to take the world-round journey, to visit the children of the yellow and brown races, and the children of the Desert and the Alps. The world journey is logically completed by the return to the New York City of today, and a description of Castle Garden, where more than a million people of foreign lands are still entering America every year. This last feature is not to be found in any child's reader on the market.

The object, in these nineteen sketches, has been to present typical pictures of such facts as children are curious about, that will furnish a

complete image that they are likely to retain, and upon which they can build further knowledge. There is also the object of creating sympathy, and consequent breadth of mind. The travelled person is always a man of wider culture and sympathy, than is the same man if he should stay at home and never come in contact with any other mode of living or thought than that in which he was born. This creating of sympathy with other people is of extreme importance in a country like ours, which is constantly being recruited by foreign peoples. We are far too apt to under-rate these newcomers, and to think that we are offering them all and receiving nothing in return. As a matter of fact there are no people who come to us but have some gift or contribution that they can make to the general welfare and pleasure.



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THE HISTORIAN

The Indian Artist is painting in sign language, on buckskin, the story of a battle with American Soldiers. When exhibited at the National Academy this picture was considered one of the most important paintings of the year. See if you can find the sign of the Indians, the United States Cavalry and the officer in command. The dots he is making are "bullets." See the arrows.

CHILDREN OF OUR OWN AND OTHER LANDS

I. THE RED CHILD OF THE FOREST

You are proud of being an American boy, aren't you? Perhaps you will be surprised to learn that there is another boy who has a better right to the name than you have. He was here four hundred years ago, when Columbus sailed over the wide ocean and found our country.

This American boy was tall and straight and slender. His eyes were as black as ink, his hair as black as a crow's wing. He could run like a deer, swim like a fish and climb like a squirrel. He was as solemn as a little owl. When he grew to a man he wore a head-dress of eagle feathers. His skin was not white like yours. It was very nearly the color of an English penny or an American one cent piece. Now you know what he was. He was an American Indian. There are still a good many Indians in our country. They live in houses, on big farms. They dress like white boys, speak English and go to school. But their faces are the same as those Columbus saw.

It was a hard, wild life the Indian boy lived. Still, he had a good deal of fun. It was like camping out all the time. There were four or five million Indians here, but the country was so big that there was room for everybody to move about a good deal. There were no cities or farms; no railway trains or wagons. The Indians had to travel on foot. They followed narrow paths, or trails, through the forests and over the plains. On the rivers and lakes they made long journeys, in boats so light that they could carry them on their shoulders from one stream to another. These boats they called canoes. They were made of birch bark stretched over frames of wood. A great many Indians travelled together, for company and for safety. Each band was called a tribe and each had a chief. When a tribe found a good place to camp, some poles were stuck in the ground in a circle. The top ends of these poles were tied together. Then the skins of wild animals, or mats woven of rushes were fastened over the poles. They called this tent a wigwam. Some Indians built dome-shaped

wigwams, like circus tents. Others built long houses of bark, big enough to shelter the tribe.

Our little Indian boy was born in a circus tent wigwam, in a village of other wigwams, in the forest. His mother put a long shirt of soft yellow deer skin on him, and taught him his first lesson before he was a day old. She taught him that he must not cry. When he cried she put her hand over his mouth. She did this because cruel enemies and wild animals might hear him. When he grew up he could bear any pain without complaining.

The Indian baby could not even kick. His mother bound him to a flat piece of birch bark, to make his back and legs straight. She hung "the baby and cradle and all" from her shoulders. She wrapped a big skin around herself and the baby, if it was cold weather, leaving his face uncovered so he could see. Then they went "by-by." Any baby would like that. When the tribe stopped to rest, the baby and his cradle were hung from the limb of a tree, and the wind rocked him to sleep.

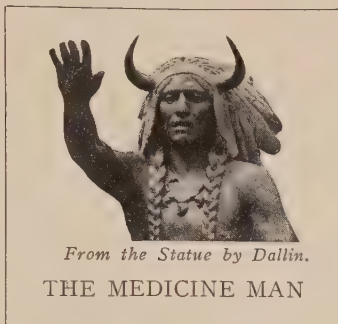
Someone was always saying "don't" to the Indian boy and girl. "Don't make a noise when you walk. You must not even rustle a leaf, or snap a twig." That might scare away the deer father was trying to kill, and then the family must go hungry. Sometimes, when out hunting, a boy had to lie for an hour, as quiet as pussy at a mouse hole. The Indian boy had to learn to strike fire from two pieces of flint; to make a bow and a stone arrow head; to make a canoe and snow shoes. He shot arrows at a mark every day; he speared fish, and threw stone hatchets. These hatchets were called tomahawks. He must be able to tell what kind of weather was coming, and learn to read the picture writing on the sign posts set up in the forests. He must learn the ways and places and calls of animals and birds, and be able to follow the tracks of men and wild beasts. He had to learn how to fight, too, or he and his family would be killed. The Indian boy was grown to a man before he had learned all his lessons.

One sign that he had grown up was that he was given a name. It was really a nickname, given for something he had done. This name he had to bear all his life, so he was very careful not to do anything foolish or cowardly. If he did something brave, and got such a name as Eagle Heart, he was so proud he couldn't sleep the first night. The Indian man was proud and brave and cunning. Sometimes he was cruel. No man could use him for a slave.

THE RED CHILD OF THE FOREST

PAST AND PRESENT

THE Indian medicine man thought he could cure disease by frightening away the evil spirits supposed to cause it, so he wore horns and other things to make him look savage. What is this medicine man wearing that used to belong to Brother Bear? Indians, when they live in wigwams, believe in medicine men, as Eagle Heart did, but most Indian children now go to school and know better. The two



From the Statue by Dallin.

THE MEDICINE MAN

center pictures show the boys and girls studying art and manual training at the Indian school at Carlisle, Pa. In the summer the boys and girls at Carlisle are allowed to work on neighboring farms where they can earn a little money and learn how farming is carried on. Our government has established a number of Indian schools and keeps them up at a cost of several million dollars a year.



"She hung the baby and cradle and all from her shoulders."



Some tribes wrap up their babies in buckskin bags.

These are wigwams like that in which Eagle Heart was born. They are made of the skins of wild animals.

If Eagle Heart's sister was a merry little maid she might be called Laughing Water. Isn't that a pretty name? Laughing Water had lessons to learn too. She had to help her mother take the skins from the wild animals the hunters brought home, and cut up and cook the meat. She had to help scrape the hair from deer skins with sharp clam shells, and rub and pull the skin until it was as soft as a kid glove. A needle she made of a fish bone; the thread of the leg tendons of the deer. Her thread was like our violin strings. It was very strong. Then she sewed the skins into shirts and leggings and moccasins and robes. She embroidered moccasins and belts with little shells, after boring holes through them; and she colored porcupine quills and pushed them in patterns through the soft yellow skin. She colored long eagle feathers and made a warrior head-dress for her father. She made herself necklaces of shells.

In the summer, the Indian women and girls dug holes in the fields, with pointed sticks or clam shells, and planted corn and beans, pumpkins and tobacco. Laughing Water had to gather the ripe corn, shell it, boil the grains in clay pots, dry them and pound them to meal in wooden bowls. She sifted the meal through a sieve she made of fine, tough grass. She wove baskets of reeds and grasses. If she had time she wove colored figures and lines in her pretty baskets. She made clay cooking pots and water jars, and she painted figures on them. One of the nicest things she did was to make candy. She made it by boiling the sweet sap of the maple tree. For her father, Laughing Water dried the broad tobacco leaves. He put these in a pipe with a stone bowl and a hollow reed stem, and smoked them.

In the evening the whole tribe sat around a big fire under the maple trees. The tired hunters smoked and talked of the hunt, or of battles. Old men and women told stories of long ago. The Indians had no books, but their old stories were not lost. Grandfathers and grandmothers told these hero tales to the children, and the children remembered the stories and told them to their grandchildren. Some day you must read "Hiawatha" and learn more about how the first American boy lived.

Eagle Heart and Laughing Water thought their home would always be as it was then. They did not know that little children with pale faces were coming to live among them.

See Plate "*Natives of North America*," Vol. I, page 60. Also see INDIANS, page 921; AZTEC, page 150; PUEBLOS, page 1559. Also in Index under INDIAN see numerous references.

II. THE LITTLE PALE FACES WHO CAME OVER THE SEA

Six year old Faithful was knitting a stocking. Her home was a pretty stone cottage with a thick roof of straw. It was in a village, in England. Roses grew around the open door. Through the door she could see the square, gray tower of a stone church. Ivy climbed the tower. The bell in the tower rang sweet chimes. The church had pointed windows of many-colored glass. The fences between the cottages were thick green hedges. A mill stood beside a dancing river. The mill-wheel churned the water to foam. On a hill top stood a castle in miles of green park, with a stone wall around it. Lords and ladies lived there. Sometimes they drove to the church in a gay coach, or they went away to the King's court in London. They wore silks and laces and plumes and jewels. Little Faithful's English home was as pretty as a fairy story. But her father often talked of going away to the New World of America, that Columbus had found, to live. They were all safe and comfortable in England, but they were not happy. They dressed and lived more soberly than their neighbors. They liked to go to a plain meeting-house, instead of to the King's stone church. For this they were punished. Unkind people mocked them, and called them Puritans. But they were proud of that name because they tried to live pure lives.

Faithful wore a long, plain gown of dark wool. A square of white lawn was folded around her neck. On her head was a stiff white linen cap almost like a sunbonnet. Her little face was rosy and dimpled; her loving eyes as blue as violets. Her yellow hair just *would* curl, and that was a trouble. A little Puritan girl had to keep her hair smooth. She wore a white apron, with a pocket to hold her thimble and thread. The Puritans thought it wicked for even a little girl to be idle. Her brother Myles wore a wide-brimmed pointed hat, knee breeches and a tightly buttoned coat. He wore a wide, square-cornered white linen collar. Both of these children had big brass or silver buckles on their stout, low shoes.

One day their father said they must get ready to go to America. Other Puritan families were going with them in a sailing vessel. They had to take ever so many things with them, for they could not

SCENES IN THE PILGRIM STORY

PROTECTED BY A GRANITE CANOPY AND BY BARS TO KEEP RELIC HUNTERS FROM CHIPPING IT AWAY, THE ROCK ON WHICH THE



PILGRIMS LANDED STILL LIES AT THE WATER'S EDGE AT PLYMOUTH WITH THE DATE OF THE LANDING CARVED UPON IT.



The Mayflower has just arrived and its passengers are landing on the "bleak New England shores."



The Pilgrims sadly watching the Mayflower as it sails back toward the comfortable homes in old England which they have given up for "freedom to worship God."



Even when they went to church the Pilgrims were obliged to go armed to protect themselves against attacks by the Indians.

buy even a paper of pins in America. They packed big chests with clothing and blankets and feather beds and table linen. Cooking pots and pewter dishes and candle sticks were put into barrels. The mother did not forget the spinning wheel and loom for weaving. The father thought of tools and seeds and guns and knives and fish nets. He put in a box of books, too. He did not take money. To trade with the Indians for furs, he took red blankets and calico and beads.

*One hundred Pilgrims stood on the deck of the Mayflower and said goodby to the green shores of England. Every one of them could do something useful. There were carpenters and shoemakers and blacksmiths and farmers. There was a soldier to lead them if they had to fight the Indians. A minister went with them, and a wise man to govern them. Puritan mothers could do nearly everything to make people comfortable. The little girls could knit and sew and mind the baby. The smallest boy could whittle wooden shoe pegs.

It was a long journey, in cold winter weather, over the sea. The Atlantic ocean is three thousand miles wide. Today we cross this ocean in steam-ships, in five days. But the Pilgrims came over three hundred years ago, in a little sailing vessel. The voyage took six weeks. Big waves beat the sides of the ship and rolled it almost over. The snow fell thick and ice covered the deck. Fogs shut them in, so they could not see where they were going. Icebergs as big as hills floated in the water, and they saw whales. By and by they saw sea gulls. They were near land.

The land was not green and pleasant like England. All they saw was black rocks, bare forests and great fields of snow. The Pilgrims got into little boats and rowed over foamy breakers to this land. They knelt on the rocks and prayed and sang hymns. And they named the bleak coast New England, after their old home.

How the trees fell in that forest! Twenty men with sharp axes chopped all day long. Soon the Pilgrims had warm log houses, with chimneys of clay and sticks. Doors of axe-hewn boards were hung on wooden hinges. Thick oiled paper covered the small holes left for windows, but there was plenty of light from the big fire of logs. The straightest logs were split and laid for floors. The carpenters made tables and stools and bedsteads. The blacksmith

* This first company who landed at Plymouth Rock, were called Pilgrims: those who came later and settled at Boston were known as Puritans.

swung long iron bars in the chimney to hang cooking pots over the fire. Everything was carried from the ship into the houses. Then the Mayflower sailed away home. The little pale faces were alone in the wide, wide, New World of America, with the red children of the forest.

They had a great deal to show each other. The Indians brought corn and told the white people how to make mush and hominy. They brought maple sugar to make syrup. They had very small grains of corn that burst into flowers when they got hot. Wasn't pop-corn a surprise? Faithful and her brother got fur hoods and mittens. They coasted on hillsides and ran on snow-shoes. They had baked Indian beans and pumpkin pudding to eat, and wild turkey with cranberries. In the summer they found wild grapes, plums and crabapples, strawberries, blackberries and blueberries. In the fall there were nuts of many kinds. They gathered wax bayberries to make sweet smelling candles. The carpenters made boats to fish for big cod. The children dug clams from the sand on the beach.

How cosy it was, in the log home in the evening! Half a tree could be put into the fireplace. The children ate their supper of hominy and syrup and deer meat from Indian bowls of wood. But they had white linen cloths and napkins. They brought their manners and their prayers and their school books to America. A woman taught them to read and write and spell and "cipher," in one of the cabins. To "cipher" is to do arithmetic sums by hard rules. They learned their letters from a horn book. The horn book was more like a slate than a book. Their only reader was the Bible. Faithful read the Bible through three times, before she was twelve years old. Besides she helped her mother. In America she had to learn to sweep a room clean with an Indian birch broom, and to brush the hearth with a turkey wing. She spun flax and wove cloth. She made soap by boiling lye water, dripped through wood ashes, and animal fat together. This made strong, brown soft soap.

Her brother went into the woods with his father to cut down trees. The forest land had to be cleared for fields, to grow corn and wheat and flax. Around every cabin was a little garden to grow peas and cabbages and flowers. Oh, how the children watched the first green sprouts come up. And how they clapped their hands when they saw the first English daisy or pink rose. The flowers made America seem more like a real home. In the fields and woods

were violets and buttercups, as in England. One tiny, sweet-smelling flower that pushed its pink, waxy clusters and glossy leaves right through the snow, in the pine woods, was strange to them. This they called the Mayflower, after their dear little sailing ship. Once in many months a sailing vessel came and brought them things from England. When it sailed away it took the furs of bears and beavers and foxes to sell in London.

Sometimes the Puritans and the Indians had dreadful battles. The red man wanted the forests for hunting, and the white man wanted the land for farms and towns. Every little settlement of white people had one big cabin that was both a meeting house and a fort. The men carried their guns and knives to church. They carried them when they went to the fields to plow. Sometimes they built high walls of pointed stakes around the village. After many years the Indians went deeper into the woods and left the country near the sea to the white people. The Puritans learned to love their home in New England. No one ever thought of going back to Old England. They had many little towns around a sea-port city called Boston.

Other English people who were different from the Puritans came to America, but Faithful and Myles never saw the little drab-gowned, soft-spoken, Quaker children who lived near the town of Philadelphia. Neither did they see the English children who lived in big houses by the wide rivers of Virginia. America was so big that the towns were hundreds of miles apart. Little Dutch children came to America to live, too, and French children and Spanish children, but they all lived so far from each other that they could not pay visits. We can go to see them today. Do you know how?

In the fairy story, when the Little Lame Prince, who was shut up in a tower, wanted to go to the land of Far Away or Long Ago he sat down on a magic carpet. Whisk! He sailed through the air as easily as a bird.

III. LITTLE WOODEN TWO SHOES

Let us follow the Mayflower as it sails back home. All the white children who came to America had to cross the Atlantic ocean. We won't stop when the ship comes to England. We will go farther over the sea.

Why, what is this? Trees growing on the edge of the ocean, and no land at all! Yes, here it is. The land lies behind the trees and lower than the water. Wouldn't you think the sea would roll in and drown the pretty red and yellow tulips in their beds? It would if the people had not built high banks of earth. These banks were called dykes. There were wide roads, bordered by trees, on top of the dykes. Crossing the low country were other wide, high dykes. Long troughs were scooped out of the tops of them, and sea water let in to make canals. Isn't it funny to see ships sailing on these canals, away above the church steeples? The towns and farms lay in deep, green bowls of land.

On the banks of the canals were windmills. The wind whirled the long, ladder-like arms. This turned big wheels in the wooden towers. Windmills ground flour and sawed wood and pumped water. The Dutch people built them in Holland where they lived. They made the wind do their hardest work. Weren't the Dutch clever people?

The people worked hard, too. Very early in the morning the men opened the shutters of the shop windows. The women scrubbed the door steps and swept the streets. Then they scrubbed the rosy faces of the children, put clean clothes on them and sent them to school. Their children, their houses, their neat brick towns, and even their farms, were so clean and bright that all Holland looked as if it was washed and ironed every day.

Clump, clump, clatter! Here comes blue-eyed Gretel in her wooden shoes, with little tow-headed brother Hans after her. Wooden shoes were good for many things. Hans sailed his on the canal, like boats. Gretel used hers for dolly cradles. At Christmas Santa Claus filled their shoes with sugar plums. Every Saturday Dutch children scrubbed their shoes with soap and water, until they were as white as little mother's kitchen table.



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"LITTLE WOODEN TWO SHOES" ABOUT TO EMBARK TO AMERICA.

Hans wore wide knickerbockers, a tight jacket and a little round cap. Gretel wore six bright wool petticoats, all at once. Her close, gold-braided cap had big rosettes over the ears. They skated on the canals in winter. They went to a big city called Am-ster-dam, in an ice-boat, with a sail. The wind sent the boat flying over the ice.

Hans and Gretel came to America with other Dutch children. They lived on a long, narrow island in the mouth of the Hudson River. The island poked its blunt nose into the ocean, so ships could come up to it. It was higher than the water, so the Dutch did not have to build dykes. But they built a wall of stakes across the island to keep the Indians out. They built a windmill too. If there had not been lots of water the Dutch children would have been as lonesome in America as ducks in a meadow. The Dutch men were merchants. They bought furs of the Indians and sent them to Holland to be sold. When the ships came for furs they brought loads of bricks to build houses. A street of neat brick houses was built like the letter U around the blunt nose of the island. The fronts faced a green park; the gardens all ran down to the water. The Dutch called this town New Am-ster-dam. After many years English people came to live with the Dutch, and they named the town New York. Today nearly four million people live in New York. It is one of the biggest cities in the world.

The great-grand-children of Hans and Gretel had two homes. One was a brown stone house in the city. The other was far up on the high, rocky bank of the Hudson River. It had a porch with white pillars, and forests and meadows were around it. They had a gay coach and fast horses to drive into the city, and they had a sail boat on the river. They spoke English instead of Dutch, and they wore leather shoes with buckles. They were Americans. They never dreamed of such a thing as going back to Holland. See New YORK, page 1334.

IV. SHIP LOADS OF POLITENESS

Very near Holland lived other children who came to America. They were French. Their names were Louis and Jeanne. French people did not like to live alone, on separate farms. When the day's work in the fields was done, they liked to visit each other. So they lived in farm villages. The stone cottages and barns, the cow sheds and chicken yards, and the kitchen gardens of twenty families, were all mixed up together in the friendliest way. Tall, slim poplar trees grew in the door yards. On a rock-cliff, above the village, was a gray stone castle with many pointed towers. In French it was called a chateau (chat-ó). A noble lord lived there. He owned the farms and the village. Everybody had to pay rent to him. Farmers who went to America could own their land and houses.

When Louis and Jeanne said goodbye to their playmates their little faces were pale, their black eyes filled with tears. They kissed people, first on one cheek and then on the other. And they said: "Adieu, cher ami!" That was French for "goodby, dear friend, we will never see you again." French children were polite. Politeness means both kind feelings and pretty manners.

Louis and Jeanne came to America in one of a fleet of ships. On the big sailing vessel that led the fleet, was a company of the king's soldiers, in gay uniforms. They had a band of music. A white flag with golden lilies on it floated from the mast. The soldiers were going to build a fort. On the other ships were miners to dig for gold, workmen and farmers. There were noble lords and ladies too, and black-robed priests, and nuns to teach the children.

The French fleet sailed far south; south of Virginia, south of the rice and cotton fields. Then the ships turned west until they came to the wide mouth of the Miss'is-sip'pi River. Soon they passed a French town on the river bank. Its name was New Orleans. The fleet did not stop there. It sailed up the river hundreds of miles. The fort was built of lime stone from the high bluff that ran along the wide, brown flood of the Miss'is-sip'pi.

Cannon were set up on the walls. Soldiers watched by the cannon. They did not watch for Indians. The Indians and the

French were good friends. They were friendly because the French were so polite. Louis called Eagle Heart his "wild brother." Jeanne kissed Laughing Water on both cheeks, and gave her a red ribbon for her hair. The soldiers in the fort watched the Spanish people who lived on the western bank of the Miss'is-sip'pi. The French and the Spanish people both claimed the big river, and they quarrelled about it. They did not need to. There was plenty of room for both.

In the shelter of the fort the farm village was built. The houses were not made of stone, as in France, but of squared logs, set on end and the cracks filled with plaster. The roofs sloped out over porches. Above the porches dormer windows jutted from the sloping roof. Roses and honeysuckles climbed the porches. There were cherry trees and peas in the garden, and tall slim poplar trees in the dooryards. In the evening there was gay talk and dancing. On St. John's eve, in June, a bonfire was built. They could see other bonfires, of other French villages, along the river. This was a part of New France in America.

The French built forts and towns on the St. Lawrence River, far to the north of the Puritans, in Canada. They called two of these towns Que-bec and Mon-tre-al. They built Detroit and other places on the Great Lakes. All along the waterways, far in the deep heart of America, you can today find places the French people named after their kings and saints. But the French soldiers went back to France long ago, and the forts crumbled. The French farmers and traders stayed in America.

Louis and Jeanne learned to speak English, but they did not forget French. Today, thousands of people in Canada speak both English and French. Our warm, southern city of New Orleans is almost as French as many cities in France. If you should ever go to New Orleans you might come to know some pale, black-eyed, polite French children. When you go away they will kiss you on both cheeks, and say goodbye. But sometimes they seem to forget that they are Americans. Then they say: "Adieu, cher ami."

V. LITTLE FRIENDS IN FURS

Before they came to America to live, the English and Dutch people were great sailors and traders. If they heard of anything they wanted, in far-away lands, they sailed away in stout ships to get it. As soon as they had a few seaport towns in America, they built sailing vessels. They needed some things that they could not buy in England and Holland.

They needed oil for lamps. They had no gas. They had no electric lights that you turn on with little black buttons. They did not even have kerosene oil. They had only candles of tallow and wax, and not enough of those. In one place there was plenty of oil. Strong, brave men could go and get it without paying money. It was in the ocean. Would you ever think of looking for oil in the water?

The oil ships sailed north into cold, dark, stormy seas. Even in summer icebergs were all around them. The sun shone, day and night. It went 'round and 'round the sky in wide circles. Polar bears were on the ice. Swimming, yellow seal barked like dogs. Walrus showed their ivory tusks. Millions of eider ducks nested on the rocky shores. Whales spouted water when they came up to breathe. The oil ships had come for the whales. Under its rubbery skin the whale was wrapped in a thick blanket of fat. When it was melted this whale blubber made good oil for lamps.

The whaling ships had to hurry to get back home before winter. In the far north it was night all the time, in the winter. The sun did not shine at all. The ocean froze over. Sometimes the sailors staid too long and their ships froze fast, in the ice.

When this happened the sailors had to go on the land to live. The land was all ice and snow too, but there were people and warm houses. A village looked very queer. It was only a lot of dome-shaped mounds of snow. Rough dogs ran from low holes in the snow huts. They made such a noise that little furry heads popped out of the holes, too. If it had not been for their fat, human faces, the sailors might have thought these children were polar bear cubs. They were Es-qui-mos, a kind of small, brown Indians. They were good-natured and friendly. It was so cold that they had to wear the skins of animals. They had soft, warm stockings of eider duck

LIFE AMONG THE ESQUIMOS

IT SEEMS odd to think of Esquimos jumping the rope, but this is one of their forms of amusement. As you see, it is not the children alone that enjoy it. Below is shown the inside of an Esquimo hut. Isn't that a queer doorway? Perhaps this man is coming home to a meal. What do you think about it? In summer these huts melt and are replaced by others of earth or hides, like those in the next illustration.



In building these huts a circle is first traced, then slabs of packed snow are laid around this circle and a house built in the shape of half a globe—something like the sugar bowl hut of the children that live in the "Zoo."



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Summer camp of a very interesting tribe of Esquimos living in North Greenland.

skin, with the down inside. Their polar bear skin jumpers had hoods. Their high boots were of reindeer skin. Es-qui-mo children were as warm and brown and greasy as buttered toast.

The children showed the white visitors the way into the house. They stooped at the low hole and slid down a toboggan tunnel. They climbed into the middle of the house through a cellar door in the floor. This was a clever way to let people in and keep the wind out, wasn't it? The house was built in a pit, of drift wood. Wrecked ships and uprooted trees floated to them from far-away lands. The frame work was covered with sod and moss. Snow fell thick on the house and froze solid.

An Es-qui-mo house had no windows, not even a hole for the smoke to go out. A bench around the wall made a table, a bed, and seats for just as many men, women, babies and dogs as could crowd into the hut. They could hardly see each other for the smoke. The hut was warmed and lighted by earthen lamps that hung from the ceiling. These had moss wicks and burned walrus fat. Over the lamps meat was cooked in earthen pots.

Ice-bound sailors often had to live with the Es-qui-mos all winter. They went hunting with the men. The stout dogs pulled the hunters on sleds made of animal bones. They killed seal and walrus and bears, with long spears called harpoons. It was not as dark as you would think. The stars and moon shone on a white, frozen world. Sometimes there were lights brighter than our sunsets; more wonderful than Fourth of July fire-works. They played all around the midnight sky in colored flames. They formed columns and crowns, curtains and banners. Ask mama to turn back to Volume I, page 140, and read to you about the *Aurora Borealis*.

When the sun came back and the ice broke up, the whalers went home with a ship load of oil in barrels. Their friends thought they were lost in the icy seas. When they were old men they sat in the bright light of whale-oil lamps and told stories of their adventures. The white children never grew tired of hearing about Agh-a-ni-to and Ny-ack, who lived in a snow house and dressed like polar bears. See **ESKIMO**, page 626.

VI. CHILDREN FROM SPAIN

Other ships sailed away for sugar. They found sugar right here in the New World. When Columbus came across the sea, before any other white man, he came in a Spanish ship. He found warm islands and the mainland, far south of where the English and Dutch people afterwards came to live. Spanish people followed him. They were glad to find that sugar cane would grow in many parts of tropical America. Sugar was worth a great deal of money. Do you know, no one, not even kings, had enough sugar to eat until shiploads of it were sent to the Old World from America?

Puritan and Dutch and Quaker lads often went as cabin boys, on the ships that sailed to the Spanish colonies for sugar. The farther south the ships sailed, the warmer it grew. The sun was high and bright; the sea and sky very blue. A steady wind blew all day long and filled the white sails. They passed dozens of green islands. On the islands were palm trees. One of the most beautiful things in the world is a palm tree, with a crown of green plumes, on the hill top of an island, against a blue sky. What would you think, then, of an island that was seven hundred miles long, and more than a hundred miles wide, lying in a sea as blue as indigo, and all its hill tops plumed with twenty-five kinds of palm trees?

"O-o-o-o-h!" is what the cabin boys on the sailing vessels said, when they saw Cuba. It was such a big island! It was so lovely, so green, so rich in fruits and other food plants. It had such wide harbors for ships, and it lay among smaller islands, right where all the ships would have to pass to go to lands beyond. No wonder the Spanish people called Cuba "The Pearl." No wonder they built their finest city in America, on the widest harbor of this jewel of an island. This city they named Havana. It was one hundred years old when the English and Dutch came to America to live.

To get to Havana a trading ship had to run the flag of its country up the mast. Then it sailed through a narrow passage into the harbor. The city was guarded by castle forts. It had a high wall around it. Over the wall, church towers and palm trees and roofs of red tile could be seen. It looked like some old Spanish city sleeping in the sun. Perhaps a Spanish merchant, in white

cotton clothes and a palm-leaf hat, invited the captain and the cabin boy to his home for breakfast.

Inside the walls of the city were low, one and two storied houses. They were colored pink and blue and lemon yellow. They were roofed with fluted red tiles from Spain. The streets were narrow. There was a public square, a palace for the royal governor, and a cathedral where ladies went to church. They wore black gowns, and shawls of black lace on their heads. In the house they wore white or gaily colored silk.

Juan (Wan) and Dolores (Dol'o-rees) ate their breakfast in the patio. The patio was the inside garden of a Spanish house. The house was built all around it. The patio was paved with marble. It was open to the blue sky. There was a fountain in it. Palms and pink oleanders, and orange trees with white blossoms and golden fruit, grew in tubs. It was cool and quiet.

The children were cool and quiet, too. They wore white cotton clothes, and sandals without stockings. They had soft black eyes and pale, cream-tinted faces. They were very polite, but rather lazy. Negro slaves waited on them. They ate oranges and bananas and pineapples. They drank chocolate and cocoanut milk. They gave their visitors salted olives and sugary raisins from Spain. If a visitor admired anything they said: "Take it, señor; it is yours." But unless it was some trifle he was not expected to take it.

These Spanish children were rich—oh, very rich. Their father had been to Mexico, or Central America, or South America. He went with Spanish soldiers who had guns and swords and cannon. They found Indians who were different from those in the north. These Indians had built cities and palaces and temples. Some of them had built stone roads over mountains and deserts. They worked the mines, and had treasures of gold and silver. But they had no guns or cannon. The Spanish soldiers killed the strong men, and made slaves of the children. They made these slaves go into the mines for more gold and silver. Most of them died. Ship loads of wealth were sent back to Spain. Rich Spaniards went back, too. Only some poor soldiers, and black slaves and dying Indians stayed behind, to build towns and make farms. After the gold and silver was all taken away, the Spanish king still kept soldiers and officers in Havana and other towns. He made all these poor people pay taxes. It was four hundred years before all these Spanish countries in America won their freedom from Spain. One of the

big Spanish islands belongs to us, today. It is called Porto Rico. It is near Cuba, and very much like it, but smaller.

Cuba, "The Pearl" of all the islands, is free today, and our country watches over it so no big nation can steal it. You can go to Havana in a fast steamship. The castle-like forts are still there, guarding the harbor. The harbor is full of ships that come for sugar, tobacco and coffee berries, oranges, bananas and pine-apples and many other good things to eat. The president of Cuba lives now in the palace of the old royal governors. In the cath-e-dral you must take off your hats. It is a church, and besides Columbus is buried there. His bones were brought from Spain to the New World he discovered. Don't you think that was right? White people and negroes, and even a few Indians live in Cuba. They are all free, now, and they all speak Spanish. The low houses under the palm trees are roofed with red tiles; the walls are painted pink and blue and lemon yellow. The little children eat their breakfast in the patio. If you admire anything that belongs to them they will bow politely and say:

"Take it, señor; it is yours." If the gift should be a little cage full of fire-flies I would take it. It would make a pretty lantern to flash and glow in the orange tree in the patio. See CUBA, page 485, and HAVANA, page 847.

VII. THE LITTLE BLACK CHILDREN WHO LIVED IN A "ZOO"

It was noon but the little boys and girls were all asleep, in the huts under the palm trees. No, they were not *still* asleep. They had got up with the sun, but when the sun was high and hot they went to bed again. Their fathers and mothers were asleep too.

The huts were as round as big sugar bowls. You might think there was sugar inside of them from the swarms of ants and flies. The walls of the huts were made of bark, the cone-shaped roofs of long palm leaves. The trees and the river seemed to be asleep, and the comical monkeys in the trees, and the ugly crocodiles in the river. The leaves were wilted by the heat. Among the drooping leaves hung cocoanuts as big as baby brother's head, and bunches of fat, yellow bananas. By and by a shower of rain fell and cooled the air. The rain was like the kiss of the prince in "Sleeping Beauty." The crocodiles yawned, the monkeys chattered, little black heads popped from the doors of the huts. Then the whole village of people tumbled out of doors.

Such funny little boys and girls! You would have laughed to see them, and they would have laughed to see you. They were as happy as kittens and laughed at everything. They were black all over. That was easily seen for they had no clothes on at all. They had big, black eyes with very white rims. Their teeth were as white as ivory, and their hair curled tight to their heads in little knots. They laughed and cried and talked and screamed. They were as noisy as the monkeys in the trees. They were negro children. Their home was in the hot jungle of a far away country called Africa.

Every child had his breakfast in his hands. Some had bread made from the flour of the manioc root. They all had baked yams, a kind of sweet potato; and ground nuts, something like our peanuts. The babies sucked sugar cane. Maybe some of them had eggs, for there were little speckled Guinea chickens in the village. They drank from long-handled gourds, and from cocoanut shells. They were as fat as little butter balls.

These children could not swim in the river, for the crocodiles would bite them in two. They did not wash their faces. When they had put bracelets of iron and copper and ivory on their arms

and ankies; strings of bright feathers, colored bone beads and crocodile teeth on their necks, they were dressed. The boys had aprons or capes of spotted leopard skin that they wore when they went with the men to hunt elephants and other animals. They carried spears and vine ropes and big baskets. Some went in palm-tree boats to hunt other animals that lived in the river.

The women and girls planted yams and ground nuts in the fields. Slaves helped them. These slaves were black people like themselves, who had been captured in battle. The women made cooking pots of clay. They wove baskets and water jugs of reeds. Water jugs were woven very close, and the cracks filled with gum from trees, so they could not leak. Negroes did not have to work as hard as Indians, but they were always in danger of being carried away for slaves.

In the evening the hunters came home with elephant tusks and baskets of meat. Perhaps it was the flesh of the hippopotamus, a big water pig. Perhaps—why, it might have been almost any kind of wild beast! Lions and tigers and leopards; elephants and rhi-noc-er-oses and gi-raffes; striped ze-bras and swift antelopes, and go-ril-las, or man monkeys with long hairy arms, and many more queer animals live in Africa. You can see them in cages in a men-ag-er-ie, or in the park zoo, today. Most of them are as terrible as their names. They did not often come into the villages, for they were afraid of the spears and traps.

One noon-time, when everyone was sound asleep, a band of painted black warriors stole into this village and made all the people prisoners. Men and women and little children had to march along the river bank. The river grew wider, and marshy plains lay along the banks. After the plains was white sand, and miles of blue water with foam caps on the waves. The black children screamed with fright. They had never seen the ocean before. They were frightened again when a ship with white wings sailed into the river mouth. Worst of all they were driven into the darkest part of the ship, under the deck, by strange looking white men.

Two hundred years ago black people were sold as slaves in many countries. Few people thought this was wrong. Ship loads of negroes were brought to America. The good Puritans bought some of them, and the gentle Quakers. Most of the slaves were sold in parts of America where it was warmer than in New England.

IN THE BLACK CHILD'S HOME



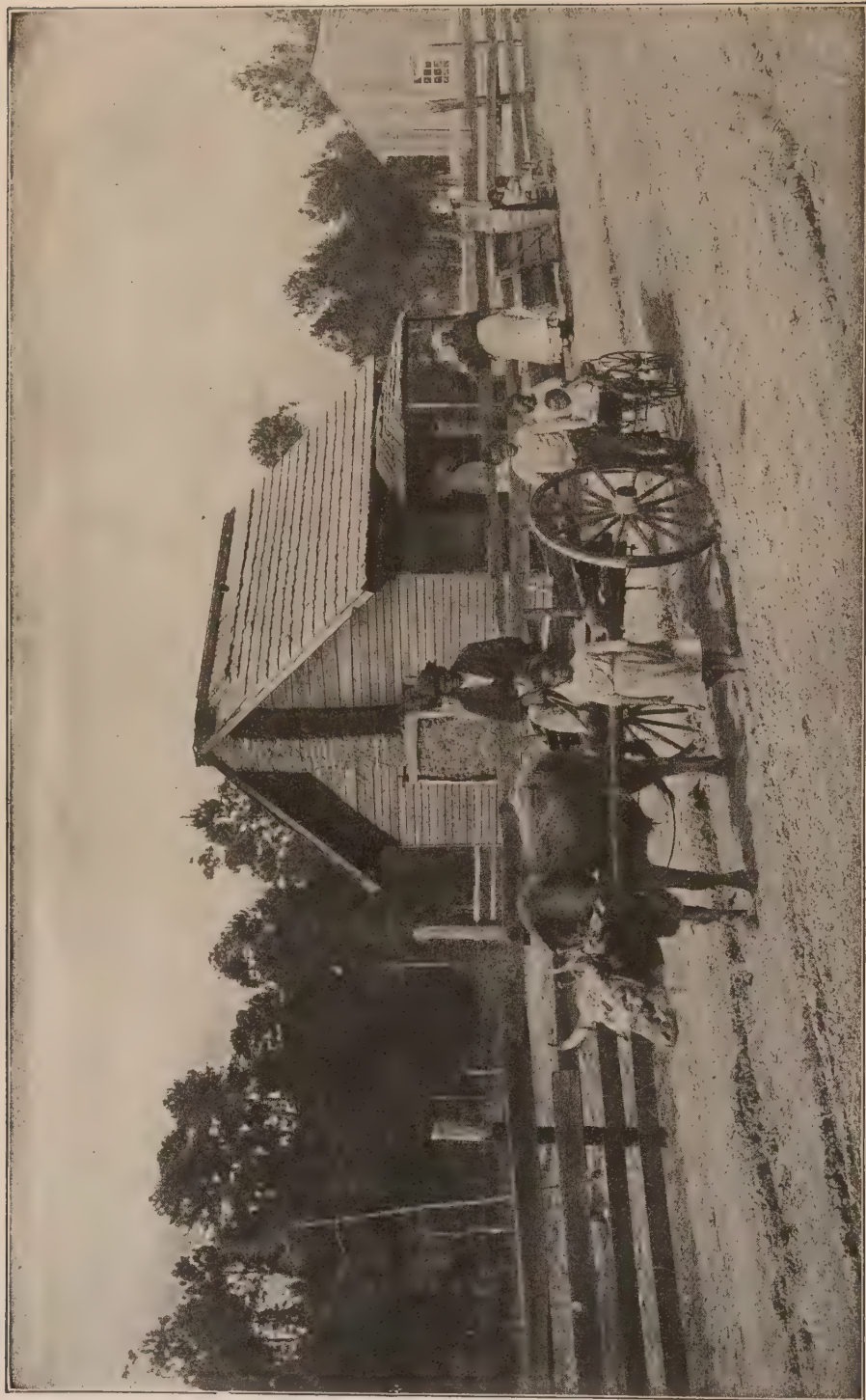
Among all nations before mills are introduced, people must crush their own grain before they can bake it. In Africa they do this in mortars with big pestles.



On the left is a group of African natives on the Zambesi river, and beside them a band of Zulus, a people who are particularly troublesome when on the warpath.



You can guess from its name what animal is fond of the fruit of this giant monkey-bread tree. Compare it with the slender palm trees on the right and the huts there shown with the one back of the Zulu warriors.



A HAPPY NEGRO FAMILY IN ALABAMA.

Virginia was warm and green like England. Many English people who came to live there were richer than the Puritans. They had large farms called plantations, and lived in big houses with white porches. Velvet lawns shaded by trees sloped to rippling rivers. Tobacco could be grown there, and that was worth much money in London. Slaves were bought to work in the tobacco fields.

The negro slaves lived near the master's house, in a village of log cabins. Calico dresses were given to the women and trousers to the men. The children had loose, short-sleeved shirts of tow linen. They slept in beds now, and sat on chairs and ate from tables. Everything was strange to them, even the way the white people talked. A boy or girl who learned quickly was taken from the field into the house. A little black boy might be called Sambo, a little girl Topsy. The negroes were not proud and brave like the Indians, nor were they cruel. They were never envious and hateful. The black "mammy" loved the little white baby she nursed. Sambo liked to catch the horses and ride with Master Roger. And Topsy liked to iron pretty dresses, to make frosted cake, and to powder and puff Mistress Evelyn's hair, lace her rosy-flowered gown and buckle her satin slippers when she went to a ball.

Many slaves were sold farther south than Virginia. They toiled in rice and cotton fields, cut sugar cane and picked coffee berries. You remember how the black children were always laughing and talking in the village of palm huts? Even after they became slaves in America they were happy, if they were warm and well-fed, and had kind masters who did not make them work too hard. On the plantations, in the evening, they talked and danced, and played on drums and bone rattles and banjos. Negroes have as sweet voices for singing as any people in the world. Sometimes the master's family, sitting in the moonlight, stopped talking to listen to the negroes singing. Perhaps your mother or big sister knows some of these negro songs. Today we love to sing "My Old Kentucky Home," "Old Black Joe," "'Way Down Upon the Suwanee River," and many other pretty negro songs.

The negroes were slaves in America for two hundred years. Then they were all set free. None of them want to go back to Africa, to the old wild life. They want to stay here and live like white people and send their children to school. They are Americans, too. They call themselves Afro-Americans.

VIII. BABES IN THE WOODS

Once they got started, people kept coming and coming and coming to America as if they never would stop! In our own part of North America, that is now the United States, three million people were living a hundred and fifty years after the Puritans came. There were many thousands of negro slaves. Most of the white people were English. We owned all the land from the Atlantic ocean to the Mississippi River. This land was fifteen hundred miles long and a thousand miles wide. But all those three million people lived on a narrow strip of land along the sea coast. They began to feel crowded.

Why didn't they move back from the sea, and spread over the land? They couldn't. There was a wall. It was a wide, high, double wall of mountain ranges. The wall was nearly straight, but the seacoast bent in and out. Here the land ran away out into the water. There the water took a big bite out of the land. So in some places the seacoast land was more than a hundred miles wide. In others it was much narrower. The Indians were pushed and pushed back by the white people. At last they went over the mountain wall. They went by a trail that the white men could not find for a long time.

White men lived far up on the mountain slopes. The land there was rough, rocky hills. It was not good for growing corn and wheat. Men had to hunt like Indians to get enough to eat. They were strong and brave and hardy. They could do everything the Indians did. Much of the time they lived in the woods. While in the mountains back of the Virginia plantations, a party of white hunters found the Indian trail over the wall. It was through a high, narrow valley. The Cum-ber-land River started there, in mountain springs. It cut a deep pass through which men could ride on horseback. The pass was called Cum-ber-land Gap.

These daring hunters went through the Gap and down the Western slope. They built no fire. They kept their food pouches filled, their moccasins tied to their guns. They rolled in blankets at night, and slept on their guns. They thought the Indians might see them. On the least alarm they slipped into the deep woods. One morning they saw a park-like country at their feet. There

were miles and miles of green meadows, with bright rivers and giant trees. The park was full of deer and other game.

The white men made up their minds to stay in this fair wilderness. They built some cabins inside a log fort. More men, and a few women and children were hurried over the Gap, and into the rude fort. A white baby was born there. There was even a wedding in the fort. Then began a life of daring and danger of many years. The earliest Puritans had not lived so hard a life as these hunters in Kentucky and Tennessee. They were hundreds of miles from the French towns on the Mississippi. The mountain wall was behind them. Ships could not come to them. They could neither buy nor sell anything.

Some years they dared not go outside the forts to grow corn. The men slipped out to hunt. Sometimes they did not come back. The Indians followed them and killed them. Sometimes painted red warriors danced around a fort. Very little boys had to learn to shoot, to protect their mothers and sisters. But more white people came. A hundred came for every one killed. They found another trail over the mountains to the Ohio River. They came down this river in keel boats. The Indians shot at them from the banks. Fleets of canoes followed the keel boats. Then soldiers came and fought battles with the Indians, so white people could live in that country. At last, after thirty-five years, there were little log towns and lonely cabins, scattered all through Kentucky and Tennessee.

Daniel Boone was one of the hunters who built the first forts. Find the story about him. Then we will tell you the story of a boy who was born when Daniel Boone was more than seventy years old. He was born in one of the lonely cabins in the woods of Kentucky. That was one hundred years ago. We will learn how he lived, what he did, and what kind of a man he became.

IX. PIONEER DAYS AND WAYS

It was a cold morning in mid-winter, one hundred years ago. Around the little log cabin the snow lay deep among the stumps of trees in the clearing. A zig-zag fence of rails was around the field and the cabin. Blue smoke rose from the chimney of sticks and clay. You could easily have gone into the cabin because there was no door. A buffalo robe was hung before the doorway for a curtain. Wild beasts from the forest—bears and wolves and wild-cats—could have gone in, too, but wild animals will not go near a fire. A big fire of logs burned in the fire-place.

What a wretched place to live! It was not much better than an Indian wigwam. The fire was the only splendid thing in the cabin. No, another beautiful thing was there. It was a pale young mother with a new baby. They lay on a bed of corn husks. It was raised from the floor on a frame work of poles. Over the mother and baby was a bear skin to keep them warm. The mother was not strong, but she was brave and sweet. She was glad the baby boy was big and strong, for he would have to work hard.

Presently, they had a visitor. It was a ten year old boy. His cheeks were red with the cold, and he was out of breath. He had run two miles, through the woods, to see the new baby. There were more wild-cats than babies in the woods of Kentucky. Besides, this baby was his cousin. He said that he was "tickled to death" to have a boy cousin. The boy was dressed in yellow deer-skin like an Indian. He wore moccasins, and a coon-skin cap with the tail hanging to his neck. A woman came and dressed the baby in yellow flannel and tow linen. She cooked some hominy and deer meat. She stewed some dried blackberries in wild honey. Then she went back to her own cabin, miles away through the woods. The boy stayed. At night he rolled up in a bear skin and slept by the fire place. The father went hunting so they could all have food.

Little boys had to grow up very fast in the back woods of Kentucky. When this baby was five years old he could catch fish, set traps for rabbits, get wood for his mother, and drop corn in the furrows, behind his father's plow. He went on coon hunts with men and dogs. He followed flying bees and found their honey in hollow trees. His father was a good carpenter, but nobody had



EMIGRANTS MOVING WEST IN COVERED WAGONS, OFTEN CALLED PRAIRIE SCHOONERS

money to pay for carpenter work. He had to hunt, and fish, and grow corn, and chop trees and burn stumps. He had no time to put a floor in his cabin. The land was too poor to grow much corn. When the boy was eight years old the father said they must move a hundred miles away to get a better farm.

The mother packed everything that was worth taking with them, on the backs of two horses. The family walked. The big cousin drove a cow. The father carried a gun and shot game for their supper. When they came to the Ohio River they made a big raft of logs for a flat-boat. Even the horses and the cow went on the raft. The men pushed it across with long poles. The water was too wide and deep for the horses to swim. Then they were in a new state called Indiana.

They built a pole shack in the woods. A pole shack was a shed, open on one side. It wasn't nearly as good as a wigwam. The fire was outside. They lived in the shack a year. The boy was only nine, when the mother died, just as they got a good cabin built. Little, tired, wildwood lady! That life was too hard for her.

The boy helped his father and cousin saw boards from a green log to make a coffin. He whittled pegs to fasten the boards together. They had no nails. They buried the mother under maple trees, near where the deer came down to drink. The boy never forgot how his mother died. As long as he lived his eyes were sad, his lips tender. He pitied and loved and helped everything weak and helpless.

That lonely winter he studied his spelling book. His mother had told him that his grandfather came from good people in Virginia. She taught him to read and write. She told him he must study. By and by, a good stepmother came. She had three children so it was not so lonely in the cabin. She had a wagon load of tables and beds and chairs and blankets and dishes. She had a spinning wheel and a loom. The stepmother was a strong, kind, clever woman, who made everyone comfortable and happy. She found out that the boy loved books, and she helped him all she could.

He walked twenty miles to borrow a big law book. His cousin gave him a book of fables. He split cord wood to buy a little Life of Washington. He kept a book in the bosom of his checked shirt. At noon he sat under a tree and read a book, as he ate a dry, hard, corn dodger for his dinner. In the nearest village, he read a newspaper in a log store. When he grew up he knew more than any

man in the country. He could do more work, too, for he was tall and strong. He would not quarrel, and he made other men stop fighting. Everyone laughed at his funny stories. They wondered at his wise talk. He was so honest that he was called "Honest Abe." Now you know who he was. He was our great president, Abraham Lincoln.

Lincoln wanted to see the world. He went down the Ohio River, and on down the Mississippi River. He had no money for travelling. He went as a deck hand on a river boat. He saw the towns along the rivers, and the big, warm, French city of New Orleans. For a long time he thought he would learn to be a pilot, to guide boats safely on the big river.

When he was twenty-one Lincoln's father moved again. They went west into Illinois. They moved in covered wagons drawn by oxen. They drove for two hundred miles, through woods, across swamps and over the grassy prairies. The new home was built on a river bank. Lincoln helped his father build a cabin. He split rails to make a fence around the corn field. Then he left home to make his own way in the world. The women cried to see him go. The men gripped his big hand. They all loved him.

He went to clerk in a village store. It was a big, busy town of thirty log houses. The school teacher taught Lincoln grammar. He studied law by himself. He had no money to buy books. In a larger town, twenty miles away, were lawyers. They loaned law books to Lincoln. Still, he had to work for a living. He was a storekeeper and postmaster. He split rails, and he measured land, to mark off farms and roads. There were six years of hard work and lonely study, before he had learned enough to be a lawyer. Then he went away from the village to the state capital to live. More than twenty years later, when our country needed a brave, honest, wise man for a leader, in troubled times, it turned to this Western pioneer lawyer.

Thousands of boys were born in just such cabins in the woods. Thousands grew up into good and useful men. They made farms. They built towns and railroads. They were our great grandfathers. We are proud of them. But we are proudest of all of Lincoln. And we are proud of the worn-out mothers, who died so long ago of the hardships of pioneer days. If our great grandmothers could just have lived to know what men they gave to the world! See LINCOLN, ABRAHAM, page 1073.

X. THE CHILDREN OF THE VIKINGS

*In winter I get up at night
And dress by early candle light.
In summer, quite the other way,
I have to go to bed by day.*

If Stevenson had been a Scandinavian instead of a Scotch boy he probably would never have written that quaint rhyme about going to bed by day and getting up by night. The little people of Norway and Sweden—which together make Scandinavia—get so much night in winter and so much day in summer that it doesn't seem strange to them at all—this getting up by night and going to bed by day.

Scandinavia is so far north that in summer there are only two or three hours of darkness, in winter only two or three hours of daylight. In summer they spend most of the time outdoors. In winter they gather about the big fireplace, spin, knit, sing, play music and tell stories! These stories are about fairies and giants and Norse heroes who slew the giants and sailed those wild Northern seas. Sometimes when the stories are about big giants with ugly dispositions they get into one's dreams; and frightened little girls—I don't know about the boys—tumble out of their cots and climbing into bed with mamma, snuggle so close that, as a certain little American girl said, even the biggest giant couldn't "unsnuggle" them!

Yes, and they *do* have to climb; for the beds of grown folks are built so high that you must use a stepladder as you do in a Pullman to get into the upper berth. Babies sleep in baskets hung from a pole fastened to the wall and have a lovely time teetering themselves whenever they move.

The children have beautiful manners; never interrupt their elders and on getting up from the table say, "Thank you, dear father and mother, for the good food," and shake hands with them. From early childhood boys and girls learn to work. The hardest thing the girls have to learn is how to roll and bake the famous flat bread called knackbrode. It is made of barley meal rolled into sheets a half yard across as thin as paper and—the funniest thing—has a hole in the middle. For what do you suppose? So that mother can run a long pole through it and hang the bread from the ceiling. The boys

tend the garden, catch fish, shoot game for the family table and drive the cows up to the high, glacier-fed meadows in the mountains. In winter they see that the winter wheat sheaf is kept hanging to the barn roof-pole for the birds and help father make useful things at the bench in the farm carpenter shop. But the Scandinavian peoples—boys and girls and all—play at their playtime as hard as they work in worktime. Christmas merrymaking lasts for three weeks and ends on Knut's Day, January 13. Santa Claus they call "Tomt."

It was one of the bold vikings of Scandinavia—Lief Ericson—who first discovered America, 400 years before Columbus, and the Scandinavians have been discovering it ever since. A fifth of all the Scandinavians in the world—including the Danes, who belong to the same race—are now in the States which have been carved out of the old Northwest Territory—Wisconsin, Minnesota, the Dakotas, Iowa and northern Illinois. In later years a great many have gone to Washington and Oregon. In these northern latitudes they can have farms of a size undreamed of in the narrow mountain valleys of Norway or even the plains of Sweden and a climate not unlike that of the old home across the stormy sea. The Norwegians are mainly to be found outside the cities on farms, although there are many Swedish farmers also; because Sweden, being much more thickly populated than Norway, sends more immigrants to this country. Both Norwegians and Swedes being great sailors are found on the vessels of the Great Lakes and both are workers in the lumber camps. Swedes are workers on railroads and thousands of them come to the cities. The better educated hold high positions as mechanical and electrical engineers, as teachers in public schools and professors in colleges.

XI. THE MIRACULOUS PITCHER

If the Holland people brought the Christmas tree to America the Irish brought us something for every day in the year. It was like the milk in the mi-rac-u-lous pitcher. No matter how much was given away the pitcher was always full.

You wouldn't think people so poor would have anything at all to give away. Why, they were so poor the children were hungry. There were Kathleen and Nora and Pat, Larry and Tommie and baby Mary. They lived in a little gray plastered cottage in Ireland. The floor under their bare feet was black earth, the straw roof leaked in wet weather. The farm was just one acre for growing potatoes. A lot of potatoes can be grown on an acre of ground if the weather is just right. But some years there was too much rain and the potatoes rotted. Some years there wasn't enough and the potatoes grew no larger than marbles. One dreadful year many people in Ireland starved. In thousands of cottages there wasn't enough to eat in September. It was plain the potatoes would not last all winter.

The black pot was not half filled, but it bubbled bravely above the peat fire in the open grate. The potatoes made a small heap on the bare table. Father and mother just pretended to eat so the children could have enough. The mother said she didn't care for new potatoes until they got old. That was an Irish joke. It made everybody laugh. Then the father said he would have to step across the sea to England and do some real work to get an appetite. There were two jokes, for the Irish sea was eighty miles wide, and he worked at home all the time. Kathleen gathered up the peelings and two of her own potatoes to feed the pig. Poor pig, he couldn't see the joke. When *he* was hungry he squealed.

Why didn't they eat the pig? They couldn't. He was "the good little fellow who paid the rent." When father sold him the money was sent to the great nobleman who owned the potato patch and the wretched little cottage. He lived in London. All the land for miles around belonged to him. Hundreds of such poor families sold their pigs to pay rent to him. He was very rich. Ship loads of corn were sent from America to feed people, and England sent food and money too. Still, of Ireland's eight million people, three million were hungry. It was hard to get enough food to them and some really did starve.

The Irish people have light hearts and merry tongues and loving words, and these helped them bear the hunger in the great famine. In thousands of Irish cottages it was pet names every other minute. When things were at their very worst fairy god-mothers flew over the sea by thousands. They were letters. In every letter was money. The money was sent by uncles and aunts and cousins, and big brothers and sisters, who had gone to America long before. All these letters said: "Use this money to come to America where there is plenty to eat." Why, that money was like the magic wand that turned Cin-der-ella into a princess. It bought new clothes and shoes; put roses into pale cheeks. It paid for a grand journey on the sea, and set them all down, right side up, in a new home in America.

The only tool the farmer needed was his potato spade. We were digging canals and building railroads then, in America, and any man who could use a spade could earn money. The Irishman was such a good worker, and so quick to learn new ways, that he was soon "boss" of the other men. The children were sent to school. Tommie became a lawyer, Pat the Mayor of the city and Larry a soldier. The Irish people always got up in the world when they came to America. In Ireland they had no chance.

Kathleen was a school teacher and all the children loved her. It was like Mary's little lamb. Kathleen loved the children, and she told them so. Do you know the good Puritans thought it wrong to love people too much—as if you could! And pioneer life was so hard it often made people hard, too. Wasn't that too bad? So, by and by, we forgot how to tell people that we loved them. Then the Irish people came over and showed us how. They scattered jokes and loving words around as free as sunshine.

Kathleen was a darling of a teacher. She had violet-blue eyes with smiles in them. She had red-brown curling hair, a merry laugh and golden freckles on her nose. When she wanted a child to do anything she'd say "Jimmie-dear" just as if it was all one word, or "Pet Marjorie" or "Honey Bee." The children just flew to do things for Miss Kathleen. Other people began to find out that they had loving words, packed away in their hearts and getting rusty. They took them out and polished them and used them every day. No matter how many they used they had just as many left. You see it was like the milk in the mi-rac-u-lous pitcher.

Wasn't that a nice thing to bring to America? See IRELAND, page 936.



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A HOSPITABLE HOME IN IRELAND.

"Fine day, sir, and welcome"

XII. THE GOLDEN FLEECE OF AMERICA.

Did you ever hear the old Greek story of Jason who sailed away to find the golden fleece? Many people think this a story of the world-old hunt for gold mines. Nearly every people has some such story in its history. We have one in our history. Some of your grandfathers can remember when gold was found in California. Some of them were Jasons themselves. They can tell you how they sailed away in prairie schooners (skoon-ers) in search of gold. Prairie schooners were not ships. They were covered wagons drawn by horses or oxen. The seas they sailed were seas of prairie grass.

Don't be ashamed to ask where Cal-i-forn-ia is. Sixty years ago grown up people had to ask where it was and how to get there. They found out that a bird in New York City would have to fly overland three thousand miles, straight west, to get to Cal-i-forn-ia. People wished they had wings too. On half of that land no white people were living. One thousand miles was over high mountains and deserts. It was a terrible journey. Still a great many people went. They thought they would be happier if they had more money.

Men left fields half plowed, houses half built. They sold their farms and shops. In the East they hurried to New York to catch ships, for you could go a long way around by sea. In the West they hurried to Chicago. Chicago was the most western city. It had twenty thousand people. There the gold-seekers bought horses and oxen and covered wagons. They bought flour and bacon and beans; blankets and clothing; guns and tools and water barrels. Eighty thousand men, some women and a few children really went to California in that way, the first summer after gold was found. They went in big parties because it wasn't safe to go alone. All the kinds of people who were in America went.

For five hundred miles west of Chicago there were small towns, corn and wheat fields and lonely cabins. Omaha was just a fort in the Indian country. Near it was a French fur-trading post. You remember the French children who came up the Mississippi, don't you? Then it was just wil-der-ness. The fierce Sioux, the Om-a-has and the Paw-nee Indians lived there. Great herds of buffalo fed on the high, dry, grassy plains. There were no trees at all except along the few wide rivers. But, oh, the flowers! Millions of them, red

and blue and yellow and white, starred the green or brown grass. The land climbed slowly for five hundred miles, until the plain was a mile above the sea. The air was very pure and clear. Fifty miles away people could see the mountains.

One morning the children climbed out of their beds in the covered wagons to see a wall of mountains. It stood nearly two miles high above the plains. Forests were up the sides, snow on the tops. It took days to cross these mountains through high, winding passes, although they were only twenty miles wide. Brown bears and black bears and grizzly bears were in those mountains, and big-horn sheep. In the wide valley behind them were elk and deer, coy-otes, a kind of small wolves, and villages of prairie dogs. After that came mountains again, and then the wide, burning desert.

Here and there, in the desert, was bunch grass for the horses and oxen, but most of the time there was nothing growing but sage brush and thorny cactus. Little rivers trickled through deep gorges. Sometimes the water was bitter with soda. Streams sank away in the sand. Coy-otes howled at night. Black buzzards circled around the sky. There were rattle-snakes and stinging scor-pions.

Whenever water was found the barrels were filled, and every drop was used carefully. Without water the horses and oxen died. Then, everything was left behind and people stumbled across the burning land. Some died on the way. Those who found water came to another steep mountain range. From the top of this they looked down a long, gentle slope. It was green with trees and bright with mountain brooks. At the bottom was a wide, green valley and a river. Gold, in little grains and lumps, was mixed with the sand and gravel in the river beds.

Mining camps sprang up all along the streams. The miners stood in the water. They scooped up pans full of gravel and sand and washed out the gold. A few men found a great deal of gold and became rich. Most of the miners found little. But very few people went home again. The journey was too hard. Besides, California had many other kinds of wealth. Today we call it the Wonderland of America. See CALIFORNIA, page 308.

XIII. ALICE IN WONDERLAND

Alice never forgot the time she went to California with her grandpapa. Grandpapa was going back to California. The first time he went in an ox-wagon, when he was ten years old. Now he was going back from New York City in a palace car. Grandpapa was seventy and Alice was ten. She was young enough to be foolish, and grandpapa was old enough to forget that he had ever been wise. So they went to California together, and they had a perfectly grand time.

Part of the fun came from grandpapa's pretending. You know a great many grown people can't pretend a bit. Grandpapa pretended that everything would look as it did when he was a boy. He told Alice Chicago would be a little city of twenty thousand people. He asked the colored porter of the car how big it was.

"'Bout two million people, suh!"

"My, my, how it has grown since I was a boy," said grandpapa. Alice laughed and grandpapa's eyes twinkled. He pretended to be surprised all the time. Om-a-ha was a big city too. There was no fort, no fur-trading post, no Indians—there were no buffaloes. The grassy plains were covered with wheat and cornfields and busy towns. In front of the mountain wall was Denver, a city of more than one hundred thousand people.

The iron horse climbed right over the mountains. The railroad looped around the curves. It ran along the edges of cliffs, and through long snow-shed tunnels. "Now," said grandpapa, "you'll see bears that *are* bears. Don't the bears come down to the stations, and give you bear hugs, sometimes?" he asked the porter.

"No, suh, not that I evah noticed, suh. I reckon they done gone fah back in the mountains, suh!"

"Too bad, too bad," said grandpapa. "No bears, no big-horn sheep, no deer, no elk. Well, hello, there are some prairie dogs, barking at the train!" There were a few Indians at the station too, and flocks of woolly sheep on the mountain sides, with shepherds and collie dogs, and in the valleys were cattle, and cowboys on ponies. The snow peaks were there, and the dusty desert. But every once in a while they came to a mining town high up on a

shelf of rock, or a green valley with canals running through farms. The water had been brought down from the mountains to make the desert bloom. In the very driest part of the desert they found Salt Lake City, with sixty thousand people, in a big valley between mountains. The valley was all farms and orchards. The city streets were shaded by great trees, the houses set in green lawns. The train ran right across Great Salt Lake, twenty-five miles. Bathers were in the lake. They bobbed around like corks. The water was so salt they could not sink. The train climbed another steep mountain range, then slid down a long toboggan slope, through forests.

"Now," said grandpapa, "I know where I am. I'll show you where I helped my father wash gold out of the gravel in the river bed. It's just below in the valley."

This time he wasn't pretending. He really thought he could find the place, but the mining camp was gone. Gold mining was done up in the mountains. It was done in mills that crushed the gold-bearing rock. The river banks were lined with towns and farms and golden wheat fields. On the hill sides were flocks of sheep. The river grew wider. It met another river flowing north. They ran together and into wide water.

"Where are they going now?" asked Alice.

"Through the Golden Gate, to where the sun sets."

There was a big city built up the hill sides above the water. At its feet lay a wide harbor full of ships. Across the harbor they looked through a narrow strip of water walled with rocks. It was like a thick stone gate. Through the gate they saw the sun set in a great ocean. The city was called San Francisco. It's nickname was City of the Golden Gate. Alice wondered what lay out there over the wide water, where the sun set. She asked if they could get one of the ships and go to see.

"By and by, when we have seen the City of the Queen of the Angels."

Alice hugged herself. This was as good as a fairy story. She hadn't the least idea how it was coming out. Have you?

After they left the City of the Golden Gate they saw mountains two miles high, with lakes at the bottoms of their dark green pockets. They saw rivers sunk half a mile, and lined with steeples and towers of rock. Then they came to the Valley of Delight. Grandpapa called it Yo-sem-i-te Valley. There they left the train and got on a stage coach. One whole day Alice rode on a donkey.



DENVER AND THE MOUNTAINS

Here is beautiful Denver, as Alice saw it "in front of the mountain wall," and the railroad that "loops and runs along the edges of the cliffs."

They slept in a camp hotel. The valley was a mile deep. It was walled with mountains. Rivers fell from the tops of the cliffs. They tumbled after each other like Jack and Jill. A river jumped down a quarter of a mile. That was such fun, that it took a little run over rocks and jumped again. It played hide-and-seek and follow-the-leader and leap-frog down the rocks. Sometimes a falling brook spread out in a broad sheet. Sometimes it fell so far that it turned to spray and looked like a bride's long veil. The sun shone on the spray and turned it to rainbows.

Alice had no time to catch her breath before the next wonder. This was trees more than three hundred feet high and thirty feet thick. She had to lie on her back to see the tops of them. The trees looked very, very old. She thought they must have been born in the days when giants lived.

"Were they here when Columbus came to America?" Alice asked.

"Oh, yes, some of them were eight hundred years old when Columbus came."

Dear, dear! Alice wondered if they weren't tired standing and holding the blue sky up so long. Little white clouds seemed to be tangled in their evergreen leaves.

The farther south they went the warmer and dryer it became. Still there were wheat fields and sheep. By and by there were orchards of gray-green olive trees, and vineyards of big white grapes on gravelly hillsides. Some of the farms had queer houses of sun-dried yellow bricks, and with flat roofs. Many of the people were darker, with big black eyes. Every town and river was called "San" or "Santa" something. Grandpapa said that was Spanish for Saint.

Why, how did the Spanish people ever get away over into Southern California? Alice asked a sheep rancher that, as she drank milk and ate figs as sweet as honey in the patio of a farm house. Do you remember the patios in the houses in Cuba? He took off his broad-brimmed, gold-laced, pointed hat very politely, and said that he did not know. They had been there a good while. Then she asked a priest at an Indian mission church. He said the Spanish people came up from Mexico to live, many, many years before gold was found. The Spanish people made a garden out of the desert. They brought seeds and plants from Mexico, and they coaxed water down from the mountains. Many of the gold seekers did not go back home. They went down the valley five hundred miles to the Spanish towns, and they made more farms and towns near the sea around

Los Angeles. The Spanish had built a town there of sun-dried bricks, and called it the City of the Queen of the Angels. Now it was a great, rich American city of three hundred thousand people.

No wonder the Spanish people called it that! For hours and hours the train ran south through fairy land, and into summer weather, although it was Christmas time. It ran through orchards of orange and lemon trees, through grapes and figs and plums, through groves of almond and walnut trees and olives. The towns were hidden by trees, the houses covered with roses. There were palm trees, and hedges of ger-an-i-ums, ten feet high.

Right over the city of Los Angeles were mountains with snow on them. A real Christmas tree was brought down from the mountains. On New Year's day there was a flower festival. Hundreds of carriages and au-to-mo-biles were covered with roses. Flower fairies rode in open cars. Alice was a white orange blossom in a bride's wreath of little girls. Thousands of people watched the flower procession. Alice was so happy she couldn't sleep a wink that night. She wanted to live in the City of the Angels forever. See CALIFORNIA, page 308, SAN FRANCISCO, page 1671, and LOS ANGELES, page 1116.

XIV. THE CHILDREN OF TOPSY-TURVY LAND.

Wouldn't you like to visit some children who never cry when they are babies? No, they are not Indians, although they ride around on their mother's backs. Their faces are yellow. Their almond-shaped black eyes are slanting. They wear ki-mo'nos. They wipe their little noses on little paper handkerchiefs that they carry up their wide sleeves.

Japanese children! You have seen them in picture books. But how shall we really go to see them?

Let us go back to the City of the Golden Gate. One part of it is like fairy stories. The fronts of the shops are covered with red and gold dragons. This is called Chinatown because the Chinese people live there. If we hunt a long time maybe we will find a Japanese shop. The merchant is yellow, like the Chinese, but he wears American clothes and cuts his hair short. He speaks very good English. We will buy some tea, or a roll of silk, or a blue and white china bowl. If we are very polite, and we tell him we are going to get on a ship and go to Japan, perhaps he will give us a letter, and ask us to call on his brothers and sisters in Tok-io. Won't that be fine to visit Japanese children in their own home?

We get on the big steamship. It is not like the little sailing vessel—the Mayflower—that the Puritan children came in, three hundred years ago. It is a floating hotel, six stories deep, a hundred feet wide and as long as a city block. We sit on the roof of the ship. It is called the deck. The ship plows its way across the ocean. It goes very fast, but it takes days and days to get to Japan because this ocean is nearly five thousand miles wide. When we get to Japan we notice a strange thing. We may look back over the ocean we have crossed and *see the sun rise!* Japan is called the Land of the Rising Sun. The big rising sun is on all the Japanese flags. They float from ships in the harbor, and from tall houses in the city.

Here come the children, down to the dock, to meet us! They look just like their pictures. They are all dressed alike in blue or gray or flowered cotton ki-mo'nos, down to their straw or wooden sandals. We have to turn them around to see which are boys. The girls tie their sashes in big butterfly bows. The boys tuck in the

ends. And the girls do up their hair like mamas. The ki-mo'nos are not pinned or buttoned. They are just folded across the front. To keep the ki-mo'nos from flying open the children take short steps and walk pigeon toed. The biggest girl carries baby brother on her back. He is just as interested in what is going on as anybody. The children all smile, and bow very low. It is not polite in Japan to look unhappy or to say cross words. In a minute a little girl will rub her velvety, gold-colored cheek against yours. That is a Japanese kiss. She will put her arm around your waist. Then you are dear friends. She will want you to ride in the same jin-rik-i-sha with her.

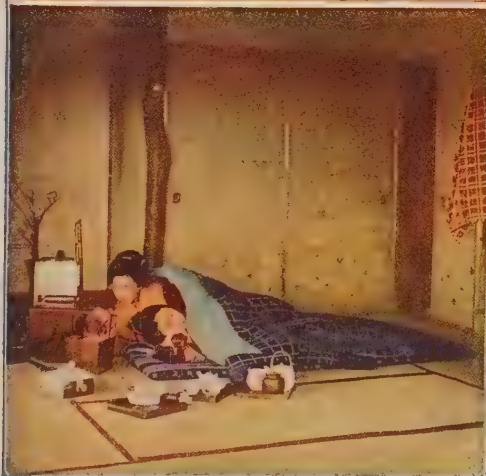
Jin-rik-i-shas are like big baby cabs on two wheels. They are pulled by men. The men wear blue or white cotton, butter-bowl hats on their heads, very short, tight breeches and loose shirts outside. In the jin-rik-i-sha you feel like twin baby sisters out with the nurse maid for an airing. You giggle, and your new little friend giggles. Then you ask her name. She says it is Cherry Blossom. That seems too good to be true. Her brother's name is Nogi after a great war hero.

How fast the jin-rik-i-sha man runs—as fast as a horse. He whirls you through the queerest streets. The houses and shops are of gray wood, with heavy, over-hanging roofs of black tiles. They are wide open. The walls are slid back so you can see everything that is going on inside. By and by you come to the children's house. They all kick off their sandals and go in in their stocking feet. No wonder, with such clean white straw mats on the floor! You take off your shoes, too. They are so troublesome you think you will get some Japanese sandals to wear.

What a funny house! It has no windows, no doors, no rooms. The walls slide back to make just one room, and that is open clear through as if it was all out doors. There are no chairs, no beds, no tables. The parlor is at the back of the house. That is the prettiest part because it looks into the prettiest little garden you ever saw.

There is a little hill, and a little river with a tiny bridge across it. There is a little lake with gold fish, and tiny twisted old pine trees. There is a little tea house in the garden. You sit on your heels before little tables a foot high, and a little maid brings tea on a tray. You drink out of dolly tea cups.

Every minute there is something new. The children stop a toy stove peddler and rent a real stove with a charcoal fire in it. You



SCENES IN JAPAN

FROM STEREOGRAPH © H. C. WHITE CO., N. Y

1—Peasant and Mt. Fujiyama. 2—Flower Garden. 3—Babies and big sisters. 4—Jinrikisha men and cherry blossom time. 5—Japanese Bed. 6—Combing out flax seed.

can have it for an hour for five cents with rice flour dough to bake cakes on it. The girls bring out their dollies. The dollies look just like themselves. The boys fly kites. The kites are shaped like fish balloons, like dragons and butterflies and animals. They play something like pussy wants a corner, and a card game like authors. They call this the game of the one hundred poets. Verses are on the cards and you have to learn them to play well.

At dinner the family sits in a circle on the floor. Each person has a little stool for a table. The maid brings food on little black and gold trays, one thing at a time. There are no knives or forks or spoons. You eat with long ivory pencils called chop-sticks—if you can. You drink soup from cups. Candy and sweet things are brought first. Then you have fish with pineapple sauce, then salad and hard green pears, then rice and tea. There is quite a peck of boiled rice in a round wooden box, with a cover to keep it hot. Rice is Japanese bread. You may eat all you want. If you drop your chop-sticks or break a cup, everybody will laugh and begin to talk about something else very fast. They know you feel bad about it and it wouldn't be polite to notice an accident.

At night the maid slides the walls in place around the house. Then she pulls out more walls, and makes as many bedrooms as are needed. She opens cupboards in the walls and tumbles out dozens of soft thick comforters onto the floor. That makes a bed. You use the top comforter for a cover. She gives you a wooden brick for a pillow. Little Cherry Blossom giggles when she sees your surprised look. But she rolls up a quilt to make you a pillow. She lies down beside you, tucks the block under her own neck and goes sound asleep in a minute.

Before you leave Japan you must go to visit a Japanese school with your little friends. You find they have forty-seven letters to learn, instead of twenty-six. And they have thousands of word signs, that look like very queer, black, bird-tracks. They write with a paint brush. Their books begin at the back, and the reading goes up and down instead of across the page. They sit on mats on the floor, in their stocking feet. They count with wooden beads strung on wires in a slate frame. They have to learn English, too. They say English is the hardest to learn of all their lessons, because it seems upside down.

If you go to Japan in the spring you will see the cherry trees in bloom, and the pear trees and plum trees. The Japanese grow

fruit trees in their little toy gardens just for the blossoms. They have a flower festival when the trees are in bloom. Everybody writes little poems about the flowers on rice paper, and ties them to the trees. Isn't that a pretty thing to do? People try to stay out of doors, in big parks, all they can, in cherry blossom time. They go up the mountain sides where miles of trees are in bloom. They take picnic lunches in little straw boxes. They carry oiled paper parasols for fear it might rain; and when they come home at night they carry red paper lanterns to light the way.

Sometimes Japan is called the Flowery Kingdom. It might be called the land of polite people, or the land of happy children. What would you call it? See JAPAN, page 960. MUTSUHITO, EMPEROR OF JAPAN, page 1292, and *Oriental Art* in article on FINE ARTS.

XV. ALL WORK AND NO PLAY FOR LITTLE WUNG FOO

If Wung Foo had studied very hard at school, and learned as many as twenty-five new sign words, his grandmother told him stories in the evening. Wung Foo was a little Chinese boy, eight years old. His father was a rich silk merchant in Canton, China. His grandmother was a little old lady. But she wore such rich clothes, her face was so carefully painted, and she had so many jewelled pins and flowers in her hair, that she looked quite young. Wung Foo was proud to have her lean on his shoulder when she wanted to cross the room. Her little crippled feet were only four inches long.

Chinese stories for children are the scar-iest kind. They are all about witches and goblins and dragons. They did not scare Wung Foo, as long as his grandmother talked in her sweet, sing-song way. Besides, his mother, his aunts, his sisters, his girl cousins and his baby brother were there in the women's sitting room. Wung Foo was a visitor. He lived on the men's side of the house.

Wung Foo had a chubby, yellow face and slanting black eyes, like Japanese Nogi. He, too, pushed a great deal of rice into his round mouth with chop-sticks, and drank many little cups of tea. In most other ways he was very, very different from Nogi. Nogi was always laughing, but Wung Foo was a sober little fellow. China isn't nearly as pleasant a place for children to be born in as Japan.

Wung Foo looked very fat in the winter time because he had to wear such thick, quilted cotton under-clothing. There were no little brass box, charcoal stoves, as in Japan, to keep the house warm. And there were no soft mats on the cold brick floors, so his gold trimmed, red cloth shoes had thick, white felt soles. He wore loose trousers of red silk, folded around his ankles, and a wadded blue silk coat fastened with gold buttons and cord loops. He kept his round cap on, even in the house. His head was shaven, all but a thick black lock on top. The barber braided some long, black silk threads with the hair, to make a queue (cue) like his father's, and left a pretty silk tassel at the end. By and by his hair would be long. Then he would not need the silk. The little boy was a small copy of his grandfather.

Wung Foo's little six year old sister was a small copy of her grandmother. She was dressed almost like her brother, but her silk trousers hung loose, like a divided skirt. She lay on cushions, on a bamboo sofa, with her bound feet under her. Sometimes she cried with pain. When grandmother told a fairy story she always said: "The beautiful maiden had such tiny feet that a mandarin's son married her." Then the little girl stopped crying. By and by she could wear satin shoes four inches long, and have her face painted, and dress her hair with flowers and jewelled pins, and very likely a mandarin's son would marry her. Of the hero, grandmother always said: "He learned all the thirty thousand sign words, worshiped at the tombs of his fathers, and became a rich merchant." Wung Foo made up his little mind that he would be very good and study hard.

A Chinese house is just as shut up as a Japanese house is wide open. Wung Foo's home had a wall around it. It stood in a garden, with a lily and fish pond, a bridge, and a curly-roofed tea-house. The women's sitting room was very pretty. It had stools and tables of carved black wood, inlaid with pearl flowers. On the walls were hung pictures embroidered on red satin, or painted on rice paper. There were vases and jars of red and gold, and blue and white. The tea trays were of silver with gold birds on them. The ladies opened and shut scented fans. They spun flax, embroidered on silk and linen and played dominoes. They had pet gold fish and singing birds. They ate a great many sweet things. When they visited other ladies they went in sedan chairs. Sedan chairs are cushioned and curtained and gilded boxes. They have four poles and are carried by men servants. The ladies could not see out of them, very well, or be seen. That was too bad, for the streets were very crowded and gay.

When Wung Foo went to bed in the men's room, he pulled a down quilt over his head. He was only a little boy, after all. In the dark the goblin stories scared him. In the morning he was awakened by a thousand noises. Watchmen told the hour on bamboo drums. Beggars beat on the gate with sticks until a servant went out with rice. Peddlars cried out that they had fish and ducks and eggs and fruits and fat puppies, to sell. A procession banged and rattled and squealed Chinese music. Wung Foo thought it was very sweet music. China had always had it. China never changed anything. He thought the old ways of doing things the very best ways in the world.

One very old way of doing things in China is for little boys to go to school before breakfast, and to go nearly every day in the

WUNG FOO'S WORK AND PLAY



These Chinese school children are playing a Chinese game called "The Dragon Head." On your right is a Chinese boy who earns his living by street exhibits of sleight of hand, such as spinning plates.



The Chinese in cities buy water of these native carriers. That Chinese farmer raises poppies from which opium is made that is the curse of his people. See his opium pipe?



For a fraction of a cent you can have a "street-car" like this all to yourself in China. It is the native Sedan chair and is quite comfortable to ride in.

year. The only vacations are at New Years, in February; on kite flying day in October, and on the feast of the lanterns day. Then fire-crackers pop and snap and bang all day long, as they do on our Fourth of July. When Wung Foo went to school there were a thousand interesting things in the crowded streets, but he never noticed them. He walked along gravely. When he met his schoolmates he shook his own hands inside his sleeves to show that he was glad to see them. The school was much like a Japanese school, except that the boys sat on stools, with higher stools in front for tables; and the teacher was very cross.

At ten o'clock Wung Foo came home for breakfast. At four he came home for dinner. It was a very good dinner of bird's nest soup, fish, duck eggs, chop-suey, rice and gam-got. When chop-suey is made of bits of chicken, ham, water chestnuts, mushrooms, celery and crisp little barley sprouts, all fried together in peanut oil and dressed with spicy brown sauce, it is very good indeed. Gam-got is little preserved oranges about as big as plums. Sometimes he had chrys-an-the-mum fritters, of the flower petals, with pineapple sauce.

Once Wung Foo went on a journey with his father. He went on a boat up the river. The river was so wide there was room for sail boats in the middle, and for streets of house-boats along the banks. Women washed and cooked on the decks of the house-boats. Children played there with little barrels tied on their backs. If they fell into the water the barrels kept them afloat until some one could pull them into the house again. The people who lived in house boats were poor. Boys no older than himself tended ducks in the marshes. Others fished with big birds that were trained to dive. They were all barefooted. The little girls had big feet. They would always have to work.

Wung Foo saw other little boys and girls picking cotton bolls, and tea leaves, and mulberry leaves to feed silk worms, and planting rice in wet ground. He saw them bending over cotton and silk looms, and carrying heavy jars and tiles at the pottery works. They worked for a few cents a day. They lived in huts and ate nothing but rice and a very little fish, and drank the poorest tea. When he went back home he studied harder than ever. He was glad he was going to be a mandarin, or at least a silk merchant like his father. Perhaps he might go away to be a merchant in Chinatown in San Francisco, America, or to Manila, in the Philippine Islands. But when he got very rich he would go back to China. See THE CHINESE EMPIRE, page 389.

XVI. ALL PLAY AND NO WORK FOR MANUELO

Manuelo was a little brown Filipino boy who played nearly all day long. He did not care how many Chinese boys came to his home in The Philippine Islands to be rich merchants. It seemed very foolish to him for anyone to work so hard when it wasn't at all necessary. A cocoanut shell full of rice, and a banana that he could pick from a tree made a very good breakfast. As for clothing, he wore nothing except when he went to the American school. He was a good-tempered, polite little boy. When he went to school he wore white cotton trousers and a jacket, to please the American lady teacher.

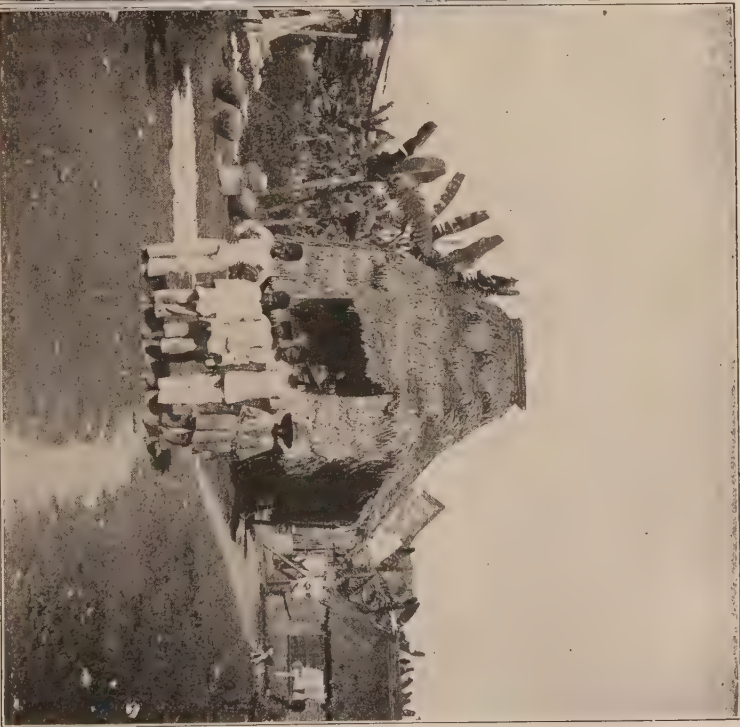
There were many things that puzzled Manuelo. He was a Filipino boy, but his name was Spanish. His language was a mixture of Spanish and his native tongue. Now the lady teacher told him he was an American boy. In the school he was learning to read English. Let us see if we can straighten out the puzzle for him.

Four hundred years ago the Spanish people, as well as the English and Dutch, were great sailors and conquerors. About thirty years after Columbus found America, another Spanish explorer named Ma-gel-lan, found a large group of three thousand big and little islands. They were away over near China. He called these islands The Philippines, after the Spanish King Philip. The Philippine Islands belonged to Spain until a few years ago. Manuelo was a baby when there was a sea-fight in the harbor of Manila. Manila is the largest city on the islands. The fight was between Spanish and American ships. After that The Philippines belonged to the United States. The Spanish soldiers went home. There was a new flag of red, white and blue. The military bands played gay new tunes. Then the lady teacher came. For the first time, little Filipino boys and girls were expected to go to school. You see now how the little brown boy became an American. There are four colors of Americans—red, white, black and brown. You will like to know the little brown American boys and girls better.

Manuelo was small. He would never grow to be a very large man, but he was straight and slender and graceful. His short black hair was straight. His bright black eyes slanted just the least little bit. His lips were thin and red. He was very clean, for he swam



HOME LIFE OF FILIPINOS IN THEIR THATCHED HUTS.



PRIMITIVE FILIPINO SCHOOL HOUSE.

From Stereograph. Copyright by H. C. White

in the sea, or in the nearest river, every day. There are many crocodiles in the rivers of The Philippines, and there are sharks in the sea. Manuело had to stay in shallow water near the shore.

Our little brown cousin lived in a village of nipa palm huts, under feathery palm trees. His father's house was built of bamboo. It was raised from the ground on thick, bamboo posts. It was thatched with nipa palm leaves. Underneath the house was a room for the chickens, the pigs and the water buffalo. They all made a great noise in the morning and woke the family up. The light woke them up, too. In the walls of the house, were sliding windows set with thin, pearly squares cut from oyster shells.

Manuело helped himself to all the rice he wanted from the red earthen cooking pot. He took a banana, an orange, a mango, a pineapple or any fruit he liked best. When he had eaten his breakfast, he tumbled down a bamboc ladder to the garden. The garden was gay with flowers and fruit trees. A thornbush fence was around it.

If no playmates were in sight, Manuело knew where to look for them. He ran first to the Plaza. Plaza is Spanish for open square. The church and the priest's house on the Plaza were as Spanish as those of Cuba. They were colored lemon yellow, and had roofs of red tiles. A few shops, and the best nipa houses of the village were on the Plaza. Market was held there some days, and the village band played there in the evenings. In the early morning the Plaza was empty and quiet. Thick, dark forests were behind the village. The woods ran up a mountain slope. From the bare top of the mountain, the steam curled. The mountain was a volcano. Sometimes the volcano made the earth tremble.

Manuело ran down a street of nipa huts to the river. The women of the village were there washing clothes. His sister Juanita (Wanee'ta) had a bamboo basket of pineapples on her head. She was going to the big market in town to sell them. Juanita was pretty. She wore a red skirt, and a white lawn jacket with wide sleeves. She smiled at Manuело and he slipped into the river. He swam and paddled and dived with forty other children for an hour.

In another part of the river were the water buffaloes chewing their cuds. They looked like clumsy, long-horned cows with thick legs, backs bent like bows and skins like pigs. They were plastered with mud. You would think them very ugly, indeed, but they were good-tempered, useful animals. They plowed the rice and hemp and cane fields; they drew the heavy, two-wheeled carts to market,

and they gave milk. Manuelo called his father's water buffalo by a pet name. The little boy climbed up on the animal's back, then slid down, held fast by her tail and had a ride in the water.

When Manuelo went home with his mother, he brought her a bamboo pail full of water from the well in the Plaza. He cleaned some rice for dinner. He put some grain in a wooden trough and beat it with a pestle, to loosen the brown hulls. Then he tossed it in the air to let the chaff blow away. He caught the grains in a basket. Sometimes, in the spring, he helped plant rice. He waded in the mud and water to set the plants in rows. You know rice needs a lot of water to grow in. He made fish nets of split bamboo and hemp.

Manuelo learned to make all sorts of things of bamboo. Perhaps you have a bamboo fishing pole, and you know how light and strong it is. It is hollow inside, and has solid joints. Bamboo is really a kind of grass that grows very thick and tall. Some of the canes are as small as a pencil; some as thick as a man's leg. In The Philippine Islands bamboo grows wild, and the Filipinos use it for many things. Bamboo is used in building houses, carts, bridges, ladders, boats and for water pipes. Split into thin strips it is woven into awnings, baskets and hats. The tender young shoots are good to eat, as we eat celery. If a Filipino is very clever, and is willing to work a little, he can have a very good house and cart, boat and baskets for nothing. And it is no great misfortune if an earthquake shakes his house down. He can easily build another.

Best of all, Manuelo liked a day in the forest, on the mountain slope, hunting bread-fruit, figs, nuts and eggs. The woods were thick and damp and hot and still. Ferns grew as tall as little trees. The palms seemed to touch the sky. The trees grew close together. There were big, twisted and thorny bushes. In the woods were ever so many curious things. There were the mounds that birds built to hide their eggs. There were tailor-bird nests that were bags of thick leaves, *sewed* with spider webs. The tailor-bird used his sharp bill for a needle. Bats hung by their wing-hooks, and fanned themselves. Monkeys chattered and quarrelled and ran races through the trees. There were orchids (or kids), great wax butterflies of blossoms, that grew on tree trunks, and fed on the air. Other things were not so pleasant. There were stinging ants and insects. There were snakes that could squeeze little boys to death, and poison snakes. But it was not often that a little Filipino boy got hurt. A number

of boys always went together, and they all kept their bright eyes and their sharp ears open.

If Manuelo's father sold his fish for good prices, he bought a white cotton suit of clothes for Sunday, or a shell comb for his wife. Manuelo's mother and sisters could make good clothing, for every day, of hemp and palm threads; and a very fine, silky gauze of pineapple fiber. But Juanita liked the bright calicos in the Chinese and American shops. She sold her fruit in the market and bought gaily colored skirts and ribbons and slippers.

In the evening, Manuelo's family sat in the open door of the house, and on the rounds of the ladder, below. Big fireflies flitted in the dark garden. They could smell the flowers and fruits. The father played a new tune on his guitar, and Juanita danced. Sometimes his father played with the village band in the Plaza. On feast days, there was a church procession with beautiful tall candles and banners. Fire crackers were snapped and rockets sent up. On dark nights, the sky above the volcano was often rosy with the fires far down in the heart of the mountain.

In the house a light burned all night. The lamp was a cocoanut shell full of oil. A light might be needed at any moment. When an earthquake shook a house, everybody must scramble down the ladder in a hurry. The animals ran out from under the house. The chickens squawked, the pigs squealed, and the water buffalo moored. The whole village of people and animals tumbled out of doors. When the trembling stopped they all went back to bed again. Manuelo turned over and over on his bed of palm leaves. He was kept awake so long that he thought perhaps he wouldn't wake up in time to go to the American school in the morning.

That would worry the lady teacher, but it wouldn't worry Manuelo. See *THE PHILIPPINE ISLANDS*, page 1469.

XVII. CHILDREN OF "THE ARABIAN NIGHTS"

You have taken a long journey since you sailed through the Golden Gate at San Francisco. Now it is time to go home. There is more than one way of going home from school, and a lot of things to see on the way. So, when you are in far away lands, there is more than one way of going home to America. Don't you want to stop, on the way, to see some children who live in a desert? They live very differently from any people that you could find anywhere else in the world. They have two things you like very much—no, three. They have sugary dates to eat, and big humpy camels and dromedaries to ride. What is the difference between a camel and a dromedary? And they have Arabian night's stories.

If you want to see Mehemet and Zaidee in their tent home in Arabia, you must call upon them very early in the morning, or after the sun goes down. From noon until four or five o'clock, when the burning sun blazes on the yellow desert sand, there seems to be no one living in the big tent. The tent is quite forty feet long, because the father of these children is a Sheik, or Arab chief. It is covered with brown camel's hair cloth, or with black and white goat skins.

It stands on a few acres of grass, under some tall date palm trees, beside a spring. The spring makes a green spot in the desert. All around that green place are miles and miles of dry sand. The sand dazzles your eyes, so you think you see other green places and palm trees and blue water. But these are only air pictures that fade away. The sand is blown up by the wind in great drifts, like yellow snow. In the shadows of these drifts and of big rocks, camels and sheep and goats lie asleep. The herders and sheep dogs are asleep among them.

If you should lift the door flap of the tent you would see a white curtain hung across the middle. This divides the big tent into two rooms. The men and boys are in one room, the women and little girls in the other. It is dark and cooler inside the tent. You must step softly, for everyone is asleep. They lie on colored mats and saddle-bag cushions. These are made of O-ri-en'tal or Eastern rugs. American people buy these rugs for their very best rooms, if they have enough money. The Arab chief buys them in the Turkish city

ARAB LIFE IN THE DESERT



Arabs can ride at full speed on their wonderful horses and, at the same time, aim and fire their guns.



Here is a group of tents in the desert that the Arab child calls "home." Notice how they differ from Indian tents.

ARAB IN THE DESERT PREPARING TO PRAY



HIS LEG IS TIED. HE CANNOT WANDER



When praying, Arabs first kneel, touch the ground with their foreheads, as these natives of India are doing, then rise with hands uplifted toward Mecca, the birthplace of Mahomet, their prophet. The natives of India are Buddhists. (See Buddha (bood'á.)

where he goes to sell his camels and his wool. He has had to pay a good deal for them, but they will wear several life times. Besides, they are the only kind of beds and seats he can carry with him. He has to move about a good deal to find food and water for his animals. He loves the rugs for their beautiful colors and patterns. Can you guess why?

Every one is asleep but Sal'adin, the master's Arabian horse. Saladin stands beside his sleeping master in the tent. He is small and dainty. His coat is like black satin. He holds up his proud head on his arched neck. He stamps his little polished hoofs on the sand. Saladin is the family pet. He is very gentle. He skims over the desert like a bird, with his master on his back. Mehemet gave him some dates to eat before he went to sleep. Zaidee kissed his black nose.

At sunset, a cool breeze blows across the desert. Everybody wakes up and sits on the mats outside the tent. Mother brings her loom to weave camel's hair cloth. The herdsmen milk the camels and goats. A servant woman makes mocha coffee. It is the best coffee in the world. The children drink goat's milk. They all eat crisp bread cakes like our crackers. They are made of wheat, barley or millet seed flour, and baked on hot stones. They eat a stew of goat's flesh or mutton. For dessert they eat dates and almonds.

Zaidee is very pretty. She would not be so very dark, but the hot sun has burned her as brown as a gypsy. Her hair is black and straight. Her soft, almond-shaped eyes are the color of brown velvet. She wears wide trousers and a loose gown of blue cotton. On her head is a blue cloth, bound into a long-tailed bonnet-cap, with a band of goat's hair. She has copper and silver bracelets on her arms and ankles, and strings of glass beads. Her brother wears a long white shirt with a leather girdle, and a white cotton bonnet bound with goat's hair. When they walk on the sharp, hot sand, they both put on leather sandals. The father wears a white turban made of many folds of thin stuff wound around his head. He smokes a pipe.

Sometimes, as the family sits in the starlight, the father or mother tells stories like those you read in the Arabian Nights. Perhaps, because of their dull lives in the dry and barren desert, the Arabs have made up the most wonderfully colored and fanciful stories of any people in the world. Their stories are full of the splendors of palaces and princes. They sparkle with jewels and are woven of

magic. The children of every people in the world listen to these stories with wide, wondering eyes. Perhaps, too, that is why the desert people love the many-colored, gaily-patterned rugs. Spread on the sand they look like flower beds.

As soon as the moon is up, the herders take down the big tent. The water is dwindling in the spring, the grass is almost gone. The family must move to a better pasture. They must go at night, when it is cool. Everything is packed on the kneeling camels. Skin bags are filled with water and bread and dates, for the journey. One by one the animals take a last drink at the spring. The camels fill the little water pockets in their stomachs, to last for several days.

Saladin, the proud bearer of his long-bearded, white-turbaned master, leads the procession. Then come the women and children on the riding dromedaries. The freight camels follow with their drivers; the brown herders and dogs drive the sheep and goats. The moon is a silver crescent in the dark blue sky. The stars are little high, white lamps. The padded feet of the camels make no sound. Camels are called ships of the desert. They swing and rock like ships across the sea of sand.

The procession grows smaller and dimmer in the distance. Now it goes over a great ridge of drifted sand and disappears. Mehemet and Zaidee are gone. But you will never forget this vast plain of white sand under the dark blue sky. It lies there so wide and silent and lonely, under the silver light of the moon and stars. See *Camel, Arabia, Arabian Stories* in article on LITERATURE, "*What is a Mirage?*" in WONDER ITEMS, and "*The Ship of the Desert*" in WILD ANIMALS.



PAINTED BY THOMAS MORAN, A. N. A.

THE HARBOR OF VENICE

"Soon you come to a third city where water streets are lined with palaces." Mr. Moran's famous sea scapes have earned him the title of the "American Turner."

XVIII. THE LITTLE COUNTRY OF THE BIG MOUNTAIN

After you have watched the ships of the desert sail away across the sea of sand, with Mehemet and Zaidee, you go down to a seaport town and get on a real ship. It steams for hours between yellow deserts. Then, all at once, it comes out through a canal, into the warmest, bluest big sea, dotted with the greenest islands and bordered by the greenest shores. The ship stops at many cities, everyone of them different, with different kinds of people.

In Athens the people are Greeks. Long, long ago the Greeks built the marble temple whose broken columns you may see on the hill. They wrote poetry and made up stories that we read today. They made marble statues so much more beautiful than any people have made since that we put plaster copies of them in our houses.

The Turkish city of Con-stan-ti-no-ple seems to be all round domes and tiny spires. In the shops there, you could buy the beautiful rugs the Arab chief had in his tent. Soon you come to a third city, where water streets are lined with palaces. That is Venice, in Italy. The dark, handsome young men in knee breeches, wide hats and red sashes, who stand up to row the swan-like boats, are Italians. The boats are called gon'do-las. As the Greek people of the old days made temples and statues and poetry, so the Italians built beautiful churches and palaces, and painted wonderful pictures and wrote more poetry.

You will not have time to stop in these places. Besides you will see all these people again, and all together, in the strangest place where you would never think of looking for them. There is just one place more where you really must stop awhile. It is so high up in the air that it would be nicer to go in a flying machine, although you could go in a railroad train from Venice. You can "play like" you are going in a flying machine. It's the easiest thing in the world to "play like" isn't it?

The finest place to start from is the open square in front of a fairy-tale palace, and the fairy-tale church of St. Mark's in Venice. They are all white marble arches and gold, and carved angels and flowers, and lovely spires that go away up to the clouds. Thousands of pigeons flutter about there, and nest in the hearts of the marble

flowers, and between the wings of the angels. They will fly a little way up with you in the gold sunshine. But very soon you leave them below you. Then the spires are below, and even the blue sea drops away out of sight.

Do you know how high you are? Nearly three miles. The air is very thin and pure and clear. Away off to the north you can see piled up clouds, all pink and pearl and violet and gold—and diamonds! See how they flash all the colors of the rainbow in the sun! Why, it's ice and snow—mountains of them away up in the sky! The mountains are called the Alps. And you are above them, looking down. What do you see?

Jagged peaks of rocks and ice are crowded and tumbled together; steep slopes and broad fields of snow lie below them. High between the slopes are hundreds of streams and cascades of glittering ice. Those are the frozen rivers called glaciers. Below them, growing on snowy slopes, are forests of dark pine trees. Farther down are green valleys where cattle feed, and in the deepest pockets of the mountains are blue lakes like mirrors. Surely no one can live in a country that stands on end like the Alps! Oh, yes they can. This mountain country is Switzerland. It is only two hundred miles long and one hundred fifty wide. Two thirds of it is mountains. Some of the peaks are nearly three miles high. But more than three million of the busiest people in the world live in Switzerland. A third of them are farmers, too.

Now you know they must use every scrap of good earth that is as big as a table cloth. On every shelf of rock a stout little house, of stone and pine timbers, nestles. On every wide shelf there is a whole village, with a school house and a church. In the valleys are big cities. On every lake shore are hotels for travellers who come from all over the world just to look at this beautiful land. Nearly every one of these travellers ask their Swiss guides how all those towns and farm-houses came to be scattered over the mountains. And they ask why the Swiss people have no language of their own but speak German, French or Italian, and sometimes all three, as well as English. This is the story the guides tell.

"Once there was a very lazy goblin. He came from the Rhine River, in Germany. He wanted a city, but was too lazy to build one. So he picked up a lot of houses and put them in a bag. Then he went across the river into France and stole some more houses. In Italy he stole palaces and churches. He put all these in his bag



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SWISS MOTHER AND CHILDREN.

With village in which they live, and in the background the Alps mountain range, showing glacier and eternal snows.

and started over the Alps with them. There was a big hole in the bag, so every once in a while a house dropped out, until he lost everything he had stolen. Every house stopped where it was dropped because it couldn't get down again. The funny thing about it was that there were people in those houses, and they staid, too, because they liked the country. They couldn't agree on a King, so they agreed to do without one; and every man kept his own language and learned the others. By and by, so many English and American travellers visited the country, that the Swiss people learned English, too." The Swiss people always tell this story to their children.

The first time her big brother Victor told her the Lazy Goblin story, little Marie Louise laughed. She loved her mountain home. From the air-ship you can see it down there on its shelf of rock. A stone wall with a grove of pine trees is behind and above it, to keep the mountain snow from falling on it. The roof slopes so far out beyond the walls, to let the snow slide off, that you cannot see its many little windows filled with blooming plants. But you can see Marie Louise outside, in her bright blue skirt, white blouse, and black velvetèen waist laced tight to her plump little body.

Marie Louise feeds the chickens and waters the potato patch. She sits among the flower beds with her knitting and watches the honey bees filling the hives. She has bread and butter and honey, wild strawberries, goat's milk and cream cheese for her dinner. She eats from a wooden bowl that her father made. Victor carved a wild strawberry vine around it. Victor made her a spoon from the horn of a chamois (sham-my). A chamois is a very fleet little mountain antelope. Her winter coat is lined with warm chamois skin. On her spoon handle is carved a bunch of edelweiss. Edelweiss is a tiny white flower that grows high up on the banks of the frozen rivers. This is how Victor got a bunch for a pattern.

He guided some travellers across the glaciers, and away up among the icy peaks. He took his iron-tipped staff, or alpenstock, to keep from slipping, and tied the travellers to loops in a long rope, one behind the other. When he brought them all down safely they gave him money. He showed Marie Louise how high, and in what dangerous places he had been, by the bunch of edelweiss in his hat.

In the summer Victor is a guide. The father goes up the mountain with the cows, to where there is sweet grass. There he lives in a little dairy house and makes butter and cheese. In the winter time they are all together in the house. There is a big porcelain

stove, as white and shining as a bath tub, to keep the house warm. The mother knits and makes embroidery to sell. The men carve wood to sell to travellers the next summer. They make bowls and cups and boxes and napkin rings, and clock cases carved with edelweiss and alpine roses and chamois heads, and with spires like the peaks of the Alps.

The children go to school in the village below. It is a mile away, but they get there in about two minutes. They *slide* down, on sleds. That is fun. But, oh dear, they have to climb back, after school! Once, when it was snowing hard, Marie Louise and some little playmates lost their way, and they got so cold and tired they fell down and went to sleep in the snow. Who do you think found them and brought their fathers to carry them home?

Big, white and tan, Saint Bernard dogs! The dogs live with some good, religious Brothers away up on the mountains, and they go out to find lost people. The dogs were so glad to find the children that they barked and called everybody for a mile around. They stood there by the snow-covered children until men came. The Swiss children love the big dogs.

Victor held Marie Louise on his lap that night, as if he would never let his little sister go, again. While she snuggled there, he finished a clock case. In it he made a tiny room with a spring-door. When it is time for the clock to strike, this door flies open in the most surprising way, and a little bird hops out and says:

"Cuckoo! Cuckoo! Cuckoo!"

Dear, dear, so late as that? It's time you were hurrying home to America. See *Red Sea, Suez Canal, Mediterranean Sea, Greece, Athens, Turkey, Constantinople, Italy, Venice, Byzantine Art, Greek Art, Italian Art*, in article on FINE ARTS, *Greek and Roman Literature*, in article on LITERATURE, SWITZERLAND, ALPS MOUNTAINS.

XIX. THE "FRONT DOOR" OF AMERICA

The very nicest time to get home to America is on a summer morning. You have been on the water nearly a week. You have crossed the same Atlantic ocean, that the white children and the black child crossed, so long ago, to find new homes. As you lie half awake in the bed that is built in the wall of your tiny cabin, some one on deck cries "Land!"

You jump out of bed, scramble into your clothes, and run to the upper deck. All the first cabin passengers are there, leaning on the rail. Far off you see, low down on the water, what looks like a bank of blue cloud. Some are looking at it through opera glasses. The sun strikes across the water. The thin morning fog flies away. Now you see green grass and trees, on the cloud bank. On the other side of a narrow strip of water is a long, sandy point with a lighthouse on it. A cheer goes up. Handkerchiefs are waved. Everybody is glad to get home. Slowly the big steamer moves through the narrow strait. All at once you are in the wide harbor of New York. This is The front door of America. Near the entrance to the harbor, on an island park, is a great statue of Liberty, holding a torch in the air.

What a different scene this is from what the Dutch children found here, three hundred years ago. Then this harbor was a wilderness of wooded shores, with only a few Indian canoes on the waters. Now, the long narrow island in the mouth of the Hudson river, and the shores around the harbor, are covered with high buildings, as far as you can see. The waters are arched with bridges, and crowded with ships.

If all this looks strange to you, think what it must look like to poor foreign people who came to America to find new homes. New ones come almost every day. You didn't know there were thousands of them on your ship, did you? A great ocean steamer is five or six stories deep, you remember. You have lived in the top story, or first cabin. You have never seen the people below you. You can see them now, as they go ashore over the gang plank, if you stand by the deck rail and look down.

A crowd of the strangest looking people pour over the gang plank from the third deck, or steerage. They look like little bits

of all the countries you have seen or read about. Few of the women wear hats. They have handkerchiefs or caps or shawls on their heads. They carry babies in their arms, on their hips or their backs. Little children cling to their short, wide skirts. The men and boys carry mountains of queer shaped bundles and boxes and bags, on their heads and shoulders. They stand by these bundles on the dock, as if they feared to lose them. Men in uniform keep the crowds moving. They shout orders in a dozen languages. The people are weary from the long journey, but oh, so interested in everything, so eager and hopeful. They wait patiently with their babies and their bundles, and do everything they are told to do.

They will not be allowed to leave this dock, as do the cabin passengers. Although they are on American soil they have not been admitted to make their homes here, yet. In the old days, every one could come in freely. They cannot do that now. We found that a great many very old people, and orphan children, and blind and crippled and feeble-minded people, came. They did not belong here, but we had to take care of them. Many bad men came, too. They had been in prison in their own land, and they gave us much trouble. So laws were passed to admit only those who were strong and well, and good honest workers. Every one who comes must have some money to give him a start. Children and old people must have some one to care for them.

All these people must get on a barge, or open boat, and go back to the emigrant station on Ellis Island. Ellis Island is just inside the harbor. You can buy a ticket and go there to see these people examined and questioned by government officers. Your boat is fast so it passes the barge.

When you leave your boat, hurry across the open space to a big building like a railway station. Go up a side stairway to a gallery that runs around a big, white-tiled room and look down. Up the wide, central stairway come the people from the barge. There are thousands of them. See if there are any you know.

Oh, there are the Dutch children. They wear wooden shoes just as they did three hundred years ago. That is an Irish family. The children have merry eyes. That is a German family. The children are stout and fair and rosy. You wonder if "dear mother" has a Christmas tree in that beautiful linen chest she sits on. There are some English or Scotch people. The little girls are shy, the boys

GATE OF OUR PROMISED LAND



HERE IS THE GREAT BARTHOLDI STATUE AT THE ENTRANCE TO NEW YORK HARBOR AT SIGHT OF WHICH THE IMMIGRANT AND THE AMERICAN RETURNING FROM FOREIGN SHORES, SHED TEARS OF JOY.



A newly arrived German immigrant with his eight children and their "liebe mutter."



Here is the immigrant station on Ellis Island where all foreigners are examined to see if there is any objection to their entering the United States.

independent little fellows. And there are such a lot of people who never came to America at all, in the old days.

Those big, black-bearded men in long overcoats, caps and high boots are Russian farmers. They will go out to wide western plains to grow wheat. We need that kind of Americans. The smaller, long-bearded men who are near them, are Russian Jews. They have had trouble about their religion, and come to us for peace and safety. They will work in tailor shops in the big cities. Some will be peddlers. By and by they will have good shops of their own.

Those men in velveteen jackets with nickel buttons and bright red vests, are Hungarians in their Sunday clothes. Some are in sheepskin coats. Their women have short skirts, bare heads and embroidered aprons. These people will work in mines and packing houses and steel foundries. There are no women with those red-capped Turks who have come to sell us Or-ien-tal rugs. Those handsome Greeks will be peddlers of fruit or of plaster casts of old Greek statues. The Italians, with dark, rosy faces, have dozens of little ones with them. The men are small, but they can do the hardest kind of labor on railroad beds and street sewers. The Norwegians are tall. In their old home they are sailors. They will not be afraid to do iron work on sky-scrapers and bridges. Those fair, very clean young women are Swedes. With the German and Irish girls they make the best housemaids in the world. There are very few people among these new-comers who cannot do some useful work.

Men in uniform are at every door and stair landing. They can speak many languages and they know what country every one comes from by his dress and face. They are kind to these strangers. Now, one says to a scared little Italian woman, in her own language:

"Sig-nor-a (madam), come in out of the draft. The bam-bin-o (baby) will catch cold." She smiles happily to hear her own dear tongue in this strange America. So it goes, all along the line. Five thousand strangers are made to feel at home.

On one stair landing stands a gov-ern-ment doctor in uniform. He looks closely at every man, woman and child. Now he pulls a man out of line and marks a cross on his sleeve with chalk. The doctor thinks this man has tu-ber'cu-lo'sis. That is a "catching" disease, and few people get well of it. He must go to a special room and be examined. Another doctor looks at people's eyes. Another looks at their faces to see if they are bright enough to earn a living. People who are a little sick from the journey are sent to a

hospital, right on the Island, and made well. Children with measles or other "catching" disease that they can be cured of, are sent to city hospitals.

Inspectors look at the numbered tag pinned to each emigrant's coat, and tell him which wire-screened room to go to. There he finds an officer who speaks his language. The officer has a long paper that tells all about him. It was filled out in the seaport town from which he sailed. Now he must answer all these questions again. What is his name, his age, his birthplace? What useful work can he do? How much money did he bring with him? Has he friends in America? Where does he want to go? Has he ever been in prison; or in an asylum; or dependent on charity? What is his health? If his answers are satisfactory and truthful he pays a fee of \$4.00. This is to pay the expenses of the emigrant station.

Then, if he is going farther than New York, an officer goes with him to the ticket office. He buys his ticket and checks his baggage. He finds that, in America, people do not drag heavy bundles about with them, but have them carried safely in trains, for nothing. Then he is put onto a barge with other people going his way, and taken to his railway station. There, another agent puts him on the right train. He is not allowed to go wrong. No one can cheat him or get his money away from him. Many have to wait until friends claim them, or until the sick members of the family come from a hospital. Such people have a big, steam-heated room to sit in. They have good food at low cost. They have white iron and canvas beds to sleep in.

Every one who is admitted to America leaves the emigrant station through a certain swing door. A smiling man in uniform stands there, looks at the admission ticket and points the way. On the door is a sign that reads:

'Push: to New York.'

That is the front door to America.

Once the new-comer is through that door he can go anywhere he likes, in our broad land, to live and work. Some days five thousand emigrants go through that door, and every year a million or more. In a few years they learn to speak English, and all other American ways. Their children go to our schools. They all change into Americans so quickly you think there must be some magic in the words on the front door:

"Push: to New York." See NEW YORK CITY, RUSSIA, HUNGARY, SWEDEN and NORWAY.



AIR AND LAND TRANSPORTATION

- 1—Dirigible Balloon. 2—Aeroplane. 3—Eskimo Dog Team. 4—Prairie Schooner. 5—Russian Troika
- 6—Reindeer Sledge. 7—Camel; Ship of the Desert. 8—First Railway Train in England, 1825.
- 9—Modern Railway Train. 10—Automobile.



MODES OF TRAVEL IN DIFFERENT COUNTRIES

11—Jinrikisha, Japan. 12—Llamas of Peru. 13—Palanquin, China. 14—Tagalog Tandem, Philippines. 15—English Coach. 16—Sicilian Cart. 17—Spanish Milkman. 18—Cart with Bamboo Cover, Borneo. 19—Elephant with Howdah (canopied seat), Siam.

WONDERS OF THE WORLD WE LIVE ON

EDITOR'S NOTE TO MOTHER AND TEACHER.—When the writer was a child, Physical Geography was a high school study. A hard name often makes a simple thing difficult. Physical Geography is only land, water and air, and their effects upon each other. It is Home Geography to every child, no matter where he lives, and within his every day experience. Before he goes to school at all, he has made sand houses and mud pies. He has paddled in ponds, picked up pebbles and shells, slid on the ice, thrown snow balls, and sent up toy balloons and sailed boats and kites. Just by using his little hands and feet and eyes, in play, he has learned more about Physical Geography than most grown people realize, and he has put his knowledge to good use. The wisest teaching of today builds upon the knowledge and interests already possessed. It follows nature's plan, too, of continuing to use the objects nearest at hand.

Home Geography, then, is the very first and most fundamental of all nature studies. Loam, sand, gravel, clay, boulders, quarry stone, coal and mineral rocks, can be brought into the house and school room. Out of these, with intelligent direction, little children can build up a miniature world that they can understand. With every natural child knowledge is power. He wants to use what he knows, to "make things." On a common kitchen table, with an upright strip nailed about the edges, he can make a landscape. A child who piles up a tiny hill, levels a field, scoops out a bowl and a trough, and fills them with water himself, can make his own definitions. From these clear mental images, he can be led to imagine the big round world of mountains, plains, rivers, lakes and oceans.

It is very wonderful how quickly a child catches an idea. In his play, he reproduces big things on a small scale. He can make a satisfactory rain with a watering pot, so he will understand the vapor cloud made by a boiling tea-kettle. Most, if not all, of the properties of earth, air and water, can be made plain to a child by just such simple means always near at hand. Air is really no more difficult than the other two. The child already knows temperature, and wind, or air in motion. The little hot-air balloon and the flying bird are among his earliest objects of wonder. The fact that air cannot be seen or felt, only adds to its interest to a child who believes in fairies.

As you read these nature studies in Home Geography, and try the experiments suggested, in doors and out, with the children, watch their minds expand, with new and interesting ideas, and open like flowers. The most important part of education is to get a child to see things accurately, and with such keen interest that he bubbles over to express himself in word, form or line.

WONDERS OF THE WORLD WE LIVE ON

I. LAND

When you went around the world you found that this earth we live upon is made of just land and water. But what a number of things were made with them. No two countries looked just the same, but they were all beautiful and interesting. Do you want to know how they came to be so different?

You need not go around the world again to find out, but it will help you to understand everything better if you will remember what you saw—the grassy plains, the high, rocky mountains, the green river valleys, the sandy desert. No matter where you live on the earth, there is land and water. In any wood or field or city park you can find out a great many of old mother earth's secrets.

This is a perfectly flat meadow, isn't it? It is covered with grass and flowers. Here is a pond, with water-flags and cat-tails and pussy willows growing about it. The water is as still as if it lay in a wash basin. No, there is a ripple on the other side. A little stream, almost buried in grass, is flowing in there. The water runs very slowly. The land on that side slopes a little toward the pond, or the tiny stream could not flow into it. Water never runs any way except down hill. Here is another little feeder to the pond, and another! Here the water runs out of the pond, through a larger brook. The meadow isn't flat at all. It is made up of little slopes. The pond is a small lake. Some lakes are hundreds of miles long, but they were formed just like this pond. The water from them flows out through a big river, instead of through a little brook. They are fed by many small rivers, and by springs underneath, too.

Wherever a pond or a lake is made on land, there must be a low place shaped like a bowl, with the land sloping down on all the sides but one. But sometimes, for hundreds of miles, the land slopes from only two sides, making a trough between. There you would find, not a lake, but a river. When the river is very long and deep, like the Mississippi, its valley is hundreds of miles wide. The slopes rise slowly, but they rise high, to the very tops of mountain ranges. Many big streams run down these long slopes to feed the main river,

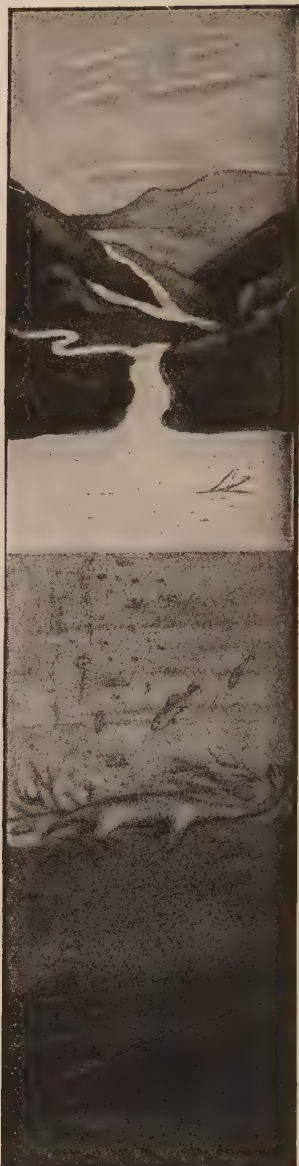
THE STORY TOLD IN THE ROCKS



The story of the earth is long. It is found recorded in the rocks. These pictures tell a part of it. You see a stream which ages ago flowed down through the mountains to the sea. Its rushing current carried sand, gravel and stones which fell to the bottom of the sea and covered up shells, bones of fish, etc., which lay on the bottom.



Later great monsters lived in the sea; some of these are shown here. The large one lifting its head above the water had a long name which means "fish lizard." As time passed the stream grew broader and washed down more stones and soil which fell into the sea, covering the sea weeds, shells, bones of dead fish, etc.



The great fish lizard was killed in a fight with other monsters, and its body fell to the bottom. Trees now grew on the land and dead trunks and branches fell into the sea, became water soaked and dropped to the bottom. All these were covered up by material which was carried down by the stream, now become a great river.

CHANGES IN THE EARTH THROUGH LONG AGES



At length great animals appeared on the land. One of these died on the river's edge; its body was caught in the swollen current and carried to the sea bottom. Here it was soon buried under the shower of soil and gravel which the river kept pouring into the sea. Each layer of this material, sand, gravel and remains of animals spread on the sea bottom hardened into rock under pressure from above.

After long ages men began to live on the earth. They lived in a very crude way. They had clumsy boats made from hollow tree trunks, bows and arrows and stone hatchets. One day a man dropped his stone hatchet from his boat and it fell to the sea bottom and was buried in the mud.

The ocean bed was thus built up toward the surface, and finally became dry land. Men dug deep into the earth, and in the rocks found marks of these buried objects; the stone hatchet, the animal and vegetable remains, shells, bones of fishes, etc., in descending layers of rock, and thus read the story as we have it here.

and little streams feed the feeders. If you made a map of the Mississippi river and all its feeders, it would look like an oak tree with no leaves on it.

Don't you want to follow a brook that flows into a river, and find out where it came from? It's a long walk, and up hill all the way. Make up a bouquet of flowers as you go. If you had a boat you could get some water lilies here, or with rubber boots for wading, some purple water flags. There are some pussy willows. How thick and green things grow, on the low river bank. And how soft and black the soil is. Where it is a little higher and dryer, you can pick ferns and buttercups. Higher still, in the maple woods along the brook, you may find violets. On that high, gravelly bank are tall, weedy looking plants. In the fall, if you come here again, you will find golden-rod and purple asters. The brook is getting narrower and shallower, but it runs faster. There it is almost hidden by hazel brush. See that squirrel? He knows there will be nuts here, and acorns in that oak tree he is running up. The brook is only a thread of water, now, but running very fast between banks of scanty grass. There is some ground pine and pink laurel, and dry gray lichens on the rocks, among scattered pine trees.

Why there is a bunch of ferns and a cushion of velvet moss! Part the ferns with your fingers, and find sparkling water gushing out of a little nest of wet rocks. This is a spring. It is the birth place of the brook. These are the only ferns you found up so high. Ferns love water and soft soil. The spring gives them the food they want.

It seems perfectly flat here. You can look over a high, wide country. Here is another spring. But the brook it makes flows the other way! Then, of course, the land must slope the other way, too. We are on a ridge of land, or divide. Sometimes a divide is called a watershed. It is like the roof of a house. The water flows down each side of a roof to the water troughs under the eaves. The rain washes the roof clean, doesn't it? Well, the little streams wash the land slopes clean. First, they soften the ground they flow over and make mud. The mud mixes



Pieces of rock broken from a cliff by rains, frost, etc., and dropped into a river.

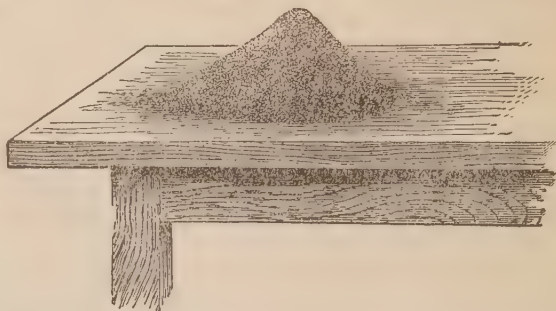
with the water and goes along with it. Stones are loosened and rolled along, too. Fill a big gold-fish bowl with this muddy water at the mouth of the brook, and let it stand awhile to settle.

Through the glass you see clear water at the top, then mud, then sand, then gravel. The gravel falls the lowest because it is the heaviest. The little brooks rob the hill sides of the soil that plants need, as well as of the water. They melt and break up this soil as fine as they can. They even take some sharp corners from the pebbles by rolling them over and over in the water. Running



Stones from same cliff after they have been worn and rounded by rolling about in the current of the river.

water is a busy miller. It grinds earth to mud, and rocks to sand. Then, when it gets down to low ground, where it flows more slowly, it drops all this heavy matter along the river banks, in the river bed, and far out into the ocean. The gravel drops first, then the sand, then the mud. If you dig a well in the valley you will find a layer of loam on top, then sand, then gravel, on a bed of stiff clay or rock. If you scoop out a river bed you find things in the same order. In the ocean you find the gravel near the shore. It hurts your bare feet when you go in bathing. The sand is farther out, and the mud farthest of all. The water sorts all this earthy matter and puts each kind by itself. Isn't that wonderful? The top layer of loam is a mixture of clay and sand and leaf mold. Leaf mold is added every season by falling leaves and decaying seeds and roots. It makes the soil softer and richer.



A heap of sand consisting of particles worn from the stones and gravel in the river bed.

This water miller has several stout helpers in wearing down land. One is wind. Wind picks up dust and scatters it. Then it is more easily washed into the streams by rain. Frost is a regular little wedge and hammer. When water freezes in a crack in a rock it swells, or expands, and splits the rock into pieces. The roots of all plants and trees split the soil, too.

Burrowing animals like muskrats, foxes and snakes make little caves that often fall in. Earth worms and beetles honeycomb the ground with tiny tunnels. Finally men loosen the soil by plowing and building. All these things make it easier for the little water miller to wash down the good top soil.

On high mountains, nothing but bare rocks are left behind, and rain, wind and frost work all the time to wear them down. The water scours the river beds deeper, and carries as much earth as it can out into the ocean. What becomes of the good soil that is washed into the ocean? It has been ground to powder or melted to paste.

Water is very heavy. A little boy or girl cannot carry a wooden pail full of it very far. Every pint of water weighs a pound. The ocean is deep. There are hills and valleys and mountain ranges on the ocean floor, just as there are on land. Some places are as deep as our mountains are high. Tons and tons of water lie over every foot of the ocean floor, and press it smooth and hard. The under layers turn to stone. All the earthy material was sorted, so now it turns to many kinds of stone—sandstone, shale rock and slate. Far out, in the deepest part of the ocean, where sand and mud are never carried, the ocean bed is made of fish bones and shells. These are ground to white powder, by the weight of the water, and turned into chalk or limestone or white marble.



A piece of rock showing the remains of little sea animals which are contained in the rock.

You know what a volcano is, don't you? It is a mountain with a fire in it. That fire comes from the middle of the earth. It lies far under all the land and sea. Sometimes this fire breaks through a mountain top, and it breaks through the floor of the ocean, too. When it does this sandstone is melted, and when it hardens again it becomes granite or lava rock.

There are quarries of all these stones and marbles on the land. If they were made in the bottom of the sea how did they get up on the land? They were pushed up by the fire. The fire melted and cracked and pushed, until the rocky floor of the ocean came up through the water to form rocky islands. A long string of these islands slowly became a mountain chain. In pushing up, the rock

layers were broken and folded in many curious ways. In valleys the rock layers rose more evenly. Just as soon as a point of rock rose above the water, rain and wind and frost and, after awhile, plants and animals began to wear it down. Slowly the valleys between the mountains were raised and filled with finely ground rock waste and leaf mold. The water from above gathered into lake bowls and river troughs.

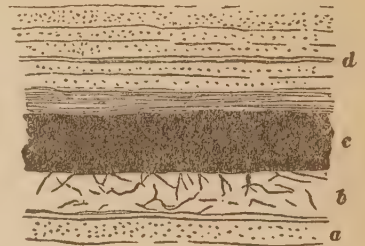


A glass of water taken from the muddy river, to show how the fine particles worn from the stones, settle down on the bottom as a layer of mud.

You see the story of land goes around a circle. Mother earth is all the time tearing down and building up. She doesn't mind spending millions of years in grinding a mountain into mud and sand; pressing these into stone, and lifting the rock layers into mountain chains again. While she is about it, too, she puts gold, silver and copper, iron, lead and tin, salt, sulphur and coal, and many other things, into all the cracks and holes, and between the layers of stone. She hides diamonds and many precious jewels, too. It would take too long to tell here how she does all these things. It took men thousands and thousands of years to find the keys to unlock the prisons of all these useful and beautiful things.

You really ought to know about coal. It was made by pressure under sea water, like stones. But what do you think it was made of? What do you look for to make a fire? Wood! Rocks may melt, but they harden again. Only plants will burn to ashes.

Ages and ages ago, simple plants like moss, with woody stems and no leaves, grew on big, quiet ponds until they covered the water. The moss died below, but did not decay, and it went on growing on top, until a spongy, floating mat many feet thick was formed. There are many such beds of moss today. They make a spongy brown fuel called peat. Peat is burned in Ireland and other countries. Peat would become coal, after a long time, if it sank below the sea, mud and sand or shells settled on it, and the sea water pressed it between layers of rock.



This picture shows a vein or bed of coal as it lies in the earth, with layers of different kinds of rock above and below it.

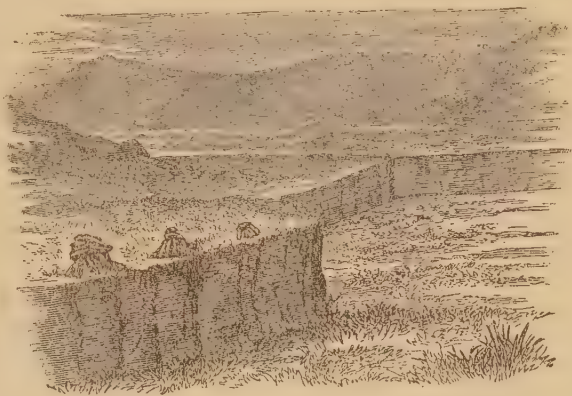


PAINTED BY THOMAS MORAN, A. N. S.

THE SENTINEL

"The Sentinel" is one of the wonderful things that Alice saw in Yellowstone Park. Two of Mr. Moran's paintings were purchased by Congress for the Capitol.

Every part of this earth story is going on today. Volcanoes still burn, earthquakes still lift and crack and fold the rocky floor of the ocean. You remember the terrible earthquakes we have had. They shook down great cities. The earth under them was lifted a little, or dropped a little. One volcano poured out melted rock, or lava and granite, and buried a city. Some seacoasts are slowly sinking, some rising. Small islands come up or disappear. The valleys are being filled up, the mountains worn down by water, wind, frost, men, animals and plants. Tons and tons



A bed of peat, showing where it has been cut out and used for fuel; also small stacks of peat piled up to dry.

of mud and sand are being carried out to the ocean every day, to be turned into stone again. Sea animals are dying, and dropping their bones and shells to the ocean floor.

Isn't it a wonderful story? Don't all these things mean a great deal more to you than they did before? See GEOLOGY.



This picture shows a volcano in action. The hollow top is the crater from which rocks and lava have been thrown out, and a stream of lava is flowing down the side.

II. WATER

The other thing this round world is made of is water. In going around the earth you crossed oceans, lakes and rivers. You saw ice or frozen water. You saw water broken up into rain drops, frozen into hailstones or snow. But there was a great deal of water everywhere that you did not see at all, or if you saw it you didn't know it was water.

The story of water is just as interesting and wonderful as the story of land. Where shall we begin to find out about it? Let us begin with one day when you were a small boy playing out of doors. Mama called you.

"Run in, Johnny, it's going to rain!"

"Why is it going to rain?" you asked. Bright little boys and girls are big question marks, running around on two stout legs. They want to know the "why" of everything. Nearly all of their "whys" are very sensible, too, and ought to be answered.

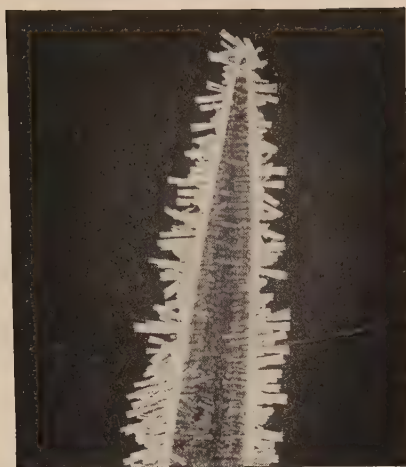
See that dark cloud rolling up the sky. That cloud is as wet as a soaked sponge. The wind is blowing it up. The wind is colder than the air was a few moments ago. Now the little drops come pattering down. They are as round as shot from whirling so far down from the sky. The sun is out again. The rain has stopped. The dark cloud is gone. Where did it go? It fell to the earth in rain drops. But how did the rain cloud get up in the sky? What is a cloud?

You can make a very small cloud if it is a cold day. Go to the door and breathe into the frosty air. You can see your breath, can't you? Not all of it, just the water in your breath. The water is broken up into very fine mist, or vapor. Vapor is a kind of water dust. The air soaks up vapor as a sponge soaks up water. There is a beautiful little vapor cloud coming from the teakettle. The air soaks that up too. A wash boiler full of boiling clothes makes a big cloud that fills the kitchen. If you open a window or door it will all go out and be soaked up by the air.

If a cloud of vapor is made in a house and cannot get out, let us see what happens. The vapor from boiling water is very warm. The glass window is colder. The vapor gathers on the glass in a mist of tiny drops. The little drops roll together into big drops.



HOAR FROST ON BLACKBERRY LEAF.



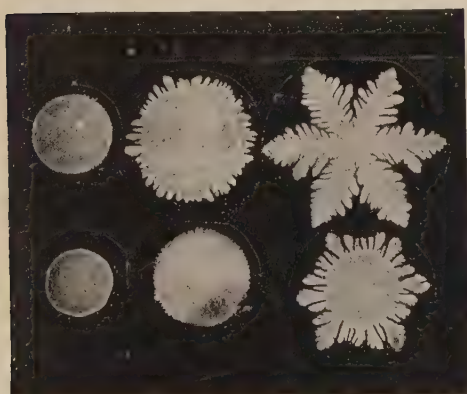
HOAR FROST ON GRASS BLADE



FEATHER-FERN FROSTWORK ON WINDOW.



SCROLL FROSTWORK ON WINDOW.



DEVELOPMENT OF ICE CRYSTAL FROM SMALL ROUND TO LACE-LIKE FORM.



CORAL-LIKE BRANCH SHOWING FEATHER TYPE IN DETAIL.



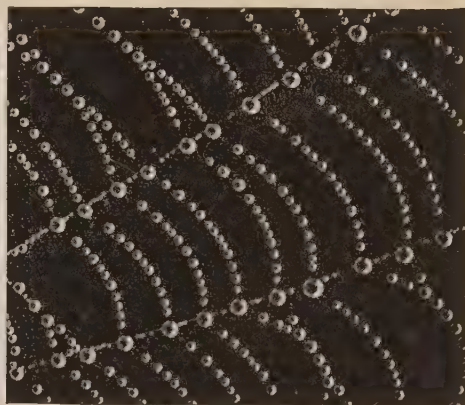
CUMULUS, A LIGHTLY FLOATING FAIR WEATHER CLOUD.



THUNDER SHOWER CLOUD.



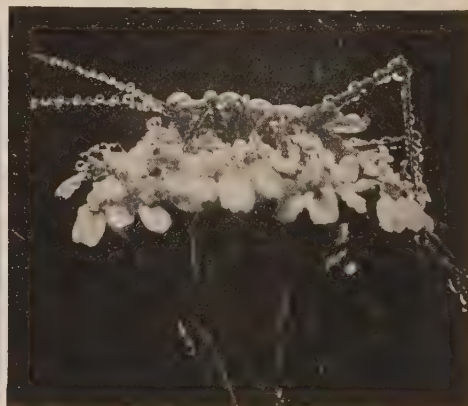
DEW-LADEN FLOWER AND BUDS OF THISTLE.



SECTION OF DEW-LADEN SPIDER'S WEB.



SLEEPING CATERPILLAR DECORATED WITH DEW-DROPS.



DEW-LADEN GRASSHOPPER ASLEEP ON BED OF FLOWERS.

The wonderfully beautiful photographs of dew and frost and also of snow crystals which we present, were furnished for this volume by Mr. Wilson A. Bentley, who is recognized as the pioneer in microphotography, and who has been employed by the government in this work for many years.

These get so heavy that they roll down the glass. They roll down the walls, too, and drop from the ceiling. If vapor is not turned out of doors it makes a room damp. That is just what happens when it rains. The vapor in the air goes up into the sky. When it finds a cold layer of air it rolls into large drops and falls.

Vapor is always going up. Most of it goes up from the ocean, the lakes and rivers. Three fourths of our big world is covered with water, you know. The sun warms the top layer of water and turns it into vapor. Every leaf and blade of grass on the land has water in it. The sun steals this water, too. Sometimes it takes so much and gives so little back again that the grass turns brown, and the leaves wilt. Every animal and plant drinks water and breathes it out again from the lungs, or gives it to the air through little holes in the skin called pores. You know how you perspire on a hot day? Little beads of water ooze out, all over you. You can find your pores with a mag-ni-fy-ing glass. You can find pores in green leaves, too.

Plants and animals perspire more on a hot day than on a cold one. The land and water give off more vapor in the summer than in the winter. Wring a handkerchief out of hot water, hang it in the sun and see how quickly it dries. Set a shallow pan of water in the sun and see how soon the water disappears. The air is always thirsty. It drinks like a greedy fish.

But then, it is not stingy. It gives back every bit of water it gets. But it does not always give it back where it got it. Sometimes it rises in vapor from the ocean, goes up in the sky to a layer of cold air, and falls back into the ocean almost as quick as you can say Jack Robinson. But it's a very good thing for little boys and girls and trees and bees, that all the vapor doesn't do that. The ocean doesn't need the water rightaway, and the land does. A great deal of vapor goes on long journeys. It uses the wind for horses. Haven't you seen fleecy clouds floating across the sky? They were riding on the wind. The winds find it no trouble at all to carry these vapor clouds along with them. The vapor clouds travel until they strike a cold layer of air. Then they roll into rain drops and fall.

As oceans are the great vapor tanks, so mountains are the chief rain makers. The tops of mountains are very cold, and they are so high up in the air that the vapor clouds bump right into them and turn to rain. In the winter the air is so cold that the rain, in falling, freezes into snow. Wide river valleys, islands and sea coasts, get a great deal of rain and snow, too, if the winds blow over them

from the ocean. If the wind blows away from the land, so that it gets no rain, that land becomes a desert.

Just as the ocean is a great tank for making vapor, so the mountains and woods and cold countries are big storage houses for snow; much of the summer rain is lost. It runs off at once into streams, or is soon taken up again by the sun, in vapor. But snow lies for months, in cold, high, or shaded places. In the spring it melts slowly and soaks into the fields. It takes snow a long time to get into rivers. It gives plants and seeds water just when they need it, to help them grow. A farmer can get along in a dry summer, if there has been a wet winter.

In the story about land you saw what a big part water plays in this world of ours. Every drop of rain that falls takes up just as much dust as it can carry on its tiny round back, and hurries away with it. It washes the dust and smoke and bad smells out of the air, and leaves it pure and clean. It washes the dust from all plants and makes them bright. It would give you a merry shower bath if you stood in it. It washes the houses and the streets. You can see muddy water running down the gutters. How clean everything is, even the pebbles in the road, after a bright, hard rain. Mother Earth has had her face washed, and she looks as if she liked it!

Sometimes vapor clouds cannot get above the earth. You know the steam from the boiling clothes could not get out of the kitchen until you opened a window at the top. If the air lies very heavy above it and does not open a place for vapor to go up, it lies on the earth. Such low clouds are called fogs. You remember the kitchen walls dripped with vapor, making the room damp? Thick fogs make people and plants almost as wet as rain. Fogs are oftenest seen over the ocean, lakes, river valleys and swamp land. Sometimes they cover miles of sea, and shut in ships with milky white curtains of vapor. Then the ships must blow fog horns to keep other ships from running into them. The morning sun pulls a fog up into the sky, or a brisk wind scatters it through the air.

There is always some vapor in the air near the earth, even if there isn't enough for you to see it. If a pitcher of cold water stands in a room a little while, beads of vapor form on the outside, just as they did on the cold window pane. Sometimes the earth is cold enough to collect vapor beads from the air. When a cool night follows a hot day, the earth becomes colder than the air above it. So the warm vapor collects on cold plants, and spangles them with dew

drops. If the night is very cold when dew forms, the little dew-drops are frozen on the plants. Then we have Jack Frost.

Jack Frost is busy with you, too. He takes the vapor of your breath and per-spi-ra-tion, as you lie warm in bed, and makes pictures with it on the cold window pane. Such pretty pictures! They are all mosses and ferns and grass spears, and spangles to trim fairy queen's dresses.

Cold is a wonderful artist with water. It makes snow crystals and hailstone pearls. Hail is made when the air is at the freezing point of water while snow is formed when the air is below this point. It may even snow and rain at the same time; the moisture first forming into snow in the cold air of the upper regions and then turning to rain as it passes through air warm enough to melt it. It frequently snows on the mountain tops while it is raining in the valleys.

The Indians called pop-corn the corn that flowers. So snow is moisture that blossoms. Next time you see a quiet snow storm, when the snow falls in large soft flakes, ask your mother for a piece of black velvet or cloth. Put it out of doors to get cold, but keep it dry. Then catch some snow flakes on it and study them through your pocket microscope. Most of them will look like little broken feathers. But if you are patient, you will be sure to find some that are perfect, six-pointed stars. The points will be veined and fringed like the petals of a flower. All snow flakes should be six sided or pointed crystals. Most of them are torn by the wind, or get their points knocked off by falling against other flakes.

Hailstones are made in quite a different way from snow flakes. Snow falls only in the winter, but hail storms come in summer, on hot days. Weather men think that when rain drops are formed in clouds, and are all ready to fall, they are suddenly pulled up much higher, into freezing air. The rain drops freeze but do not burst. Then they fall through other rain clouds, and more water freezes on the balls of ice. They are tossed up and down until they become so heavy that they drop like bullets. They drop so fast that they pass through the warm air near the earth without melting. Sometimes they are as big as pigeon's eggs. Find a very big one, some day, and ask papa to cut it across quickly, with his strong knife. You will find that the hailstone was made in layer rings like a lily bulb. The oyster makes the beautiful pearl in the same way. Around a hard center it puts layers of the pearl with which it lines its shell house. The hailstone pearl is just as beautiful as the shell pearl, but it melts so fast it is hard to study it.

But you can study larger pieces of ice. On very cold mornings you sometimes find a glass of water frozen. The water did not fill the glass, and was level. But the ice is pushed to the top, and into a little mound in the middle. When water freezes into ice it takes more room. Big people say it expands. In reading about land you learned that rocks are split by water freezing and expanding in the cracks. If water freezes in water pipes in a house, the pipes burst. Then a plumber has to come to mend them. Running water does not freeze as easily as still water. So, on cold nights, it would be a good thing to leave a faucet a little open, to keep the water flowing through the pipes.

Ice is lighter than water, that is, it fills more space for its weight, so it floats on water. It forms on top of water first, and freezes downward. You never can tell just how thick it is from the top. Before you try to slide or skate on a pond or river, you should take a hot poker and melt a hole through the ice to see how thick it is. And when ice is ready to break up, it gets "rotten" or spongy, first. You must always obey a "danger" sign that grown people put up on ice.

It is fine to see ice break up in a river. But keep off the bridges. The big blocks of ice crash against timbers and stone piers, and sometimes destroy the bridges. Sometimes, in fogs, icebergs crash into ships and sink them. When you crossed the ocean you may have seen icebergs as big as hills, floating in the sea. If you did you wondered how they were made.

Do you remember the ice rivers, or glaciers, in the high valleys of the Alps mountains? Away up north, where the Esquimos live, all the rivers are frozen. They melt a little in the summer, but more snow falls every year than is melted. The new snow presses on the old below, and squeezes it into ice, or very hard water rock, just as sea water presses sand into stone. This ice is pushed down the river beds by the weight above. The ice rivers reach the sea just as all other rivers do. In the summer the ice that is near the sea melts, or it becomes "rotten" and breaks off in large chunks. Those chunks are icebergs. They float into warmer water and melt.

It may have been a hundred years since the icebergs you saw were fleecy vapor clouds, riding on the wind-horses, in the blue sky. But there they were at last, in their old home in the ocean. Soon the berg will melt. Then the sun will turn it into vapor again, to begin another journey. (See WATER, OCEAN, SEA, GLACIER, WATERPOWER, etc.)

III. AIR

Besides land and water on the earth, there is something that is all around it, and all through both land and water. You cannot see it, or feel it, or taste it, or smell it, or hear it. But you can prove that it is all around you in a great many ways. You can take it to pieces, too, and find out what it is made of.

Measure your chest with a tape line. Twenty-eight inches? Now breathe deep, deeper. Hold your breath and measure again. Thirty inches! You filled your lungs with air. They were just as full of air as this glass pitcher is of water. This drinking glass looks as if it was empty, but it is full of air. Turn it upside down, and press the open end on the top of the water in the pitcher. Push it straight down under the water—steady; don't let the glass tip up. The water rises outside the glass and overflows. Lift the glass carefully. It is dry inside, except for a narrow



rim at the top. Some water did get inside, by squeezing the air in the glass into a little smaller space. See how much water was forced out of the pitcher. Nearly a glass full!

Big boys who dive and swim under water, fill their lungs with air first and hold their breath, so water cannot get into them. That is a very useful thing to learn to do. It saves people from drowning and makes them able to save other people.

Have you ever heard people say: "As light as air?" Perhaps you think air doesn't weigh anything.

Did you ever pump water from a well by working a pump handle? You had to pump several times before the water came, didn't you?



You had to lift the air out of the hollow pump before the water could come in. Pumping air is hard work. There are several simple ways of proving that air weighs something. Empty the teakettle of water and take the lid off. Now lay a sheet of rubber cloth over the top. Put a glass or rubber tube into the spout, and draw the air through the tube into your lungs. Breathe again. Suck all the air out of the kettle. See the rubber cloth sink. The air on top is pushing it into the kettle. There it goes, down inside. There is no air in the kettle to hold it up.

Now blow into a little rubber balloon. See it swell. Blow again, the rubber stretches. See how much air you can blow into it. Ah, it burst! There was more air inside the balloon than there was outside. Fill a glass with water until it overflows. Cover the top with a sheet of thick, smooth letter paper. Press it all around the edges so you are sure no air can get between the glass and the paper, to let the water out. Now take hold of the glass by the bottom and turn it upside down. The water will not spill, the air below holds it up. Turn back to *Air* in this book and find out what air weighs.



Just as fish and sea plants may live at the bottom of the ocean of water, so land animals and plants live at the bottom of the ocean of air. The top of this ocean of air is level, too. Do you think the air on a mountain peak would be as deep or as heavy as the air in a low valley? A glass full of water has no color. But an ocean full of water looks blue. We cannot see air itself, but we can see the color of it. When it is forty miles deep air looks blue, too.

Robert likes to climb trees, so he is just the boy to get up on a step ladder and take down those dusty curtains. Warm up there, Robert? Hot air goes up, so it is always warmer near the ceiling. You remember how warm air carries vapor up to make rain? It is the hot air that carries smoke up from chimneys. Did you ever send up a red paper balloon on the Fourth of July? You lit a tiny candle at the bottom. Soon the sides of the balloon swelled and stretched tight. Air expands when it is heated. That is, it

takes less hot air to fill anything than it does cold, so it grows lighter. The balloon floated around the sky until the candle burned out.

Warm air is always going up and cold coming down. Out of doors Mother Nature attends to this pushing, but in houses we have to help, by letting the warm air out at the top and cold air in at the bottom. Air is always in motion unless it is in prison, and prisoned air is very bad to breathe. Still air is dead; live air is always in motion.

Sometimes air rivers flow up and down so rapidly, pushing each other out of place that they make—what? See the leaves blowing on the trees. Wind! Wind is air that is in a hurry. You can feel it. Draw a *quick* breath. You felt a tiny wind in your nose, didn't you? You cannot feel air, but you can feel wind, or air in motion. You can feel the temperature of air, too. Your skin tells you if air is hot or cold. You can feel if it is damp or dry. You cannot smell air, but you can smell odors in it—the perfume of flowers, the freshness of rain, bad odors of decay, or smoke. You can train yourself to tell if the air in a room is fresh or stale. Doctors always come into a sick room with suspicious noses in the air. As we have to pay doctors for telling us when the air is bad, let us see if we can find out for ourselves.

When you were up on the step ladder, Robert, did you notice anything beside the heat? You felt smothered, then dizzy? You don't feel that way on the hottest summer day out of doors, do you? Let us see what was the matter with that air.

Put half an inch of water in a pie pan. Twist a bit of soft newspaper, light it with a match and drop it into a drinking glass. Let the glass fill with smoke, but while the paper is still burning turn the glass upside down in the pan of water. The flame goes out, leaving some paper unburned. The water *rises* in the glass, much higher than in the pan outside, and stays there. Something was burned out of the air, making room for the water to rise. The part that is gone is oxygen. If you had shut a live fly in the glass it would have died as quickly as the flame. Animals and fire cannot live without oxygen. By breathing air in you burn up oxygen. It would not take you very long to use up all the oxygen in a small room. Then, if you couldn't get any fresh air at all you would "go out" like the burning paper, and the fly in the glass.

Beside using up the oxygen in the air, when you breathe in, you make a poisonous gas when you breathe out. Fire does the

same thing. Here is a bottle of clear lime water. It cost two cents at the drug store. Divide this lime water between two small fruit jars. In one of the jars hang an inch of lighted candle above the lime water, by a wire twisted around the candle and hooked over the top. Cover the top of the jar with a folded napkin. The flame goes out as soon as the oxygen in the jar is used up, of course. But something else happens, too. The clear lime water turns milky. The flame gave out a gas called carbon dioxide, or carbonic acid gas.

Put a tube of rubber or glass, or a big lemonade straw, into the lime water in the other jar. Blow your breath through the tube, into the water. You can tell when you have forced your breath in, for you make bubbles. Do this several times. This water turns milky, too, from the carbonic acid gas in your breath. Your breath is warm so it goes up to the ceiling. The air made by a gas flame, a heat register or radiator goes up, too. All this warm air has been used by fire and by people. The oxygen has been burned out of it, and carbonic acid has put into it. It would not feed a fire or a pair of lungs, and it becomes even poisonous. This is bad air. It will go out of doors if you help it, and be purified.

Beside helping to keep people well, to know about air may help them at any time to put out a fire. Fire cannot burn without oxygen, so it can be smothered. If your clothing catches fire roll up in a rug or heavy bed clothes. Keep the fire from getting air and it will go out.

Out of doors, nature is always purifying air. She does it by having plants and animals live together. Plants make oxygen and use up the carbonic acid gas that is poisonous to breathing animals. In the sea fishes and water plants help each other, in the same way. They get air out of the water. Seeds and worms and beetles get air out of the earth. If you plant seeds too deep, or pack the earth too hard above them, they will rot. So you must read the directions on your little paper of flower seeds and obey them, or you will have no flowers. You can kill little animals by stopping up their holes sometimes.

See how wonderfully this world is mixed up. Earth is solid, water is fluid, air a gas. But there is water and air in the earth, earth and air in the water, and earth dust and water vapor in the air. They all need each other, and plants and animals need all three. Air is the freest and sets everything else in motion.

Wind, or air in motion, is a great worker and wonder-worker. It tosses the tree tops, whirls the dust, carries vapor clouds to make rain, scatters seeds. It turns the long arms of windmills and sends sailing vessels flying over the water. It waits for nobody. It says how-do-you-do and good-by, and is gone. There isn't a bit of use to get out of humor with it, if it blows our hats off and turns umbrellas wrong side out. The wind can't help blowing. It is being pushed and jostled about itself. Besides it has the most important work in the world to do—keeping air in motion and purifying it. So get off the track. Wind has the right of way. See AIR, page 33; RESPIRATION, 1602.

